台灣富創得工程股份有限公司
FORTREND ENGINEERING (HsinChu) CORP

50~450mm Lamina EFEM / Sorter

Fortrend USA

Fortrend China

Fortrend Taiwan

About Us

Fortrend Taiwan is founded in 1998 in Hsinchu city, Taiwan. Fortrend has always been the top leader in batch wafer transfer technologies, Standard Mechanical Interface (SMIF) technologies, ultra-clean automation solutions, and wafer surface curing processes for the semiconductor and PV industries. Fortrend SMIF products have become the crucial automation connections between process equipment and the factory delivery system and between different processing equipment. Fortrend's standard 200mm and 300mm front end automation modules are readily integrated into processing tools reliably and cost effectively. Fortrend's 3DIC thermal curing tools set the industrial standards for wafer surface curing processes. Fortrend offers not only standard automation and thermal curing modules, but also custom solutions allowing us to meet custom challenges and difficult configuration requirements quickly with a minimum of expenses. Contact Fortrend and experience our engineering excellence first hand.

What Set Us Apart

- Serving 200mm SMIF automation market since 1998 and the dominant solution provider for 200mm SMIF market
- Custom mini-environment solution provider. Specialized in ultra-clean, air-tight, humility controlled, airborne particle controlled, and chemical isolation mini-environments
- Complete 300mm wafer handling product lines (sorters, EFEM, clean room subtract handling robots, FOUP openers, and factory automation software) since 2008
- Worldwide leader in ultra-clean wafer baking oven for 3DIC and polymer curing applications since 2012
- IP developer in robotic solutions and control technologies with worldwide patent protection

200mm Wafer Sorter
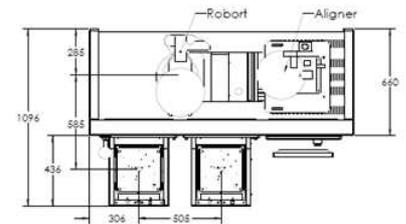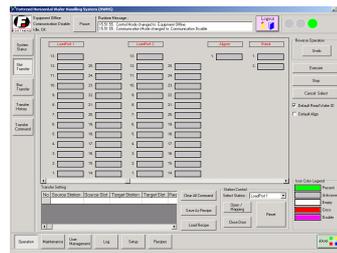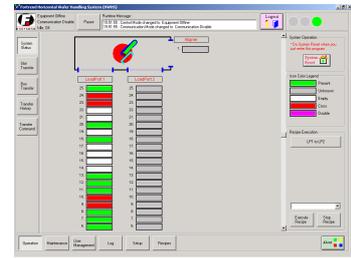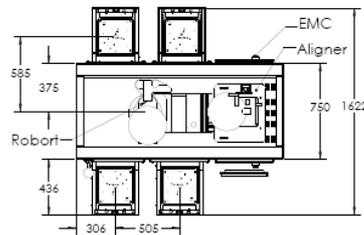
Wafer Sorter (2ports and 4ports)

Intelligent Operation GUI **Compact and Customize Configurable System Design**

Specification

Classification	Sorter Specification	
	2 ports	4 ports
Size (W x D x H)	1626 x 1096 x 1860 mm	1622 x 1622 x 1860 mm
Wafer size	200m wafer	
Cleanness	Class 1 @ 0.1µm	
Through put	500 WPH (Without OCR and Aligner)	
	250 WPH (With OCR and Aligner)	
End-effector	Vacuum blade or edge gripper or none touch end-effector	
Robot repeatability	± 0.1 mm	
Aligner repeatability	± 0.1 mm	
Communication	SECS I/HSMS and SECS II	
MTTR	< 2 hours	
MTBF	>8,000 hours	
Wafer breakage rate	< 10 per 1,000,000 wafers	
OS	Window 10 Professional or newer	
Power requirement	220 V, 60 Hz, 3 wires, 1 phase	
EEF Option	1+1 Blade or 1+5 Blade	

300mm Wafer Sorter
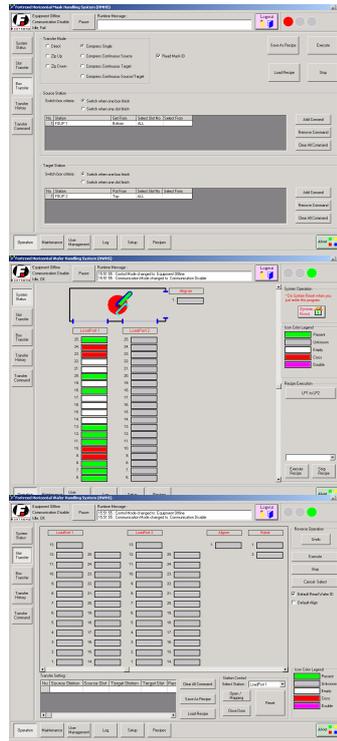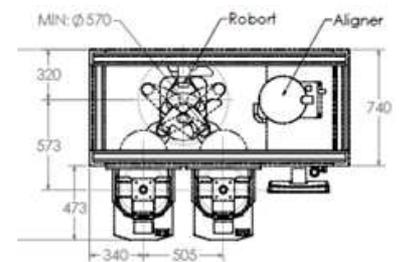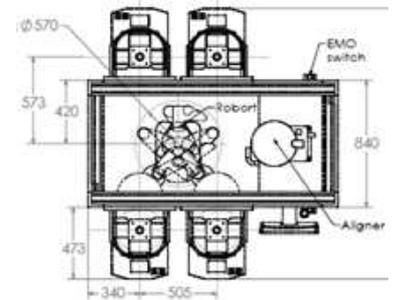
Wafer Sorter (2ports and 4ports)

Intelligent Operation GUI

Compact and Customize
Configurable System Design

## Specification

Classification	Sorter Specification	
	2 ports	4 ports
Size (W x D x H)	1640 x 1213 x 2020 mm	1640 x 1786 x 2020 mm
Wafer size	300mm wafer	
Cleanness	Class 1 @ 0.1µm	
Through put	500 WPH (Without OCR and Aligner)	
	250 WPH (With OCR and Aligner)	
End-effector	Vacuum blade or edge gripper or none touch end-effector	
Robot repeatability	± 0.1 mm	
Aligner repeatability	± 0.1 mm	
Communication	SECS I/HSMS and SECS II	
MTTR	< 2 hours	
MTBF	>8,000 hours	
Wafer breakage rate	< 10 per 1,000,000 wafers	
OS	Window 10 Professional or newer	
Power requirement	220 V, 60 Hz, 3 wires, 1 phase	
EEF Option	1+1 Blade or 1+5 Blade	

Sorting function

Slot Transfer	Freely select wafers and their target to transfer. Each selection can independently support alignment and ID reading for throughput improvements
Box Transfer (Batch transfer)	Transfer wafers from pod to pod or batch to batch. Alignment and reading wafer ID are configurable options
Read	Read all wafers ID and display them on GUI. Wafers are put back to original slot after reading ID
Sort by ID	Read all wafers' ID and sort the wafers according to their ID reads. Sorting can be in the same pod or use another empty pod as the target
Find	Read all wafers ID and display wafers' information if they meet user input criteria. Wafers are put back to original slot after reading ID
Match Slot by ID	Read all wafers' ID and transfer wafers to the specified slot as their ID. Sorting can be in the same pod or use another empty pod as the target
Odd/Even	Read all wafers' ID in a specified port and transfer wafers to the other specified port according to their ID are even or odd. Source pod can be assigned as a port for Odd or Even
Split	Read all wafers' ID in a specified port and transfer wafers to the other specified port if their ID meet the user inputted criteria. Wafer will be transferred back if there are no meet criteria. Target port can be multiple.
Merge	Read all wafers' ID in one or more port and transfer wafers to a specified port if their ID meet the user inputted criteria.

Software Features

Feature	Description
Wafer status display	Display each slot wafer status – present, empty or even cross with different color for an easily quick view of wafer status.
Recipe edition/operation	All transfer/sorting function can be saved as a recipe for a quick execution.
Transfer log trace	Save wafer transfer log to be able to trace in the future. Automatic delete old log to save disk space.
Manual control	Step by step to operate each module for system verification.
PM suggestion	Log each module operation times to provide a hint for a PM request.
Reliability test	Flexible reliability test selection to test each module after installation or main service.
Complete operation log	Text format log to assist finding root cause after error happens. Automatic delete old log to save disk space.
User management	Provide three user levels – Operator, Engineer and Administrator for a better security system operation.
SECS/GEM	SEMI Standard host communication ability. SECS I or HSMS are all available.

Thin Wafer Sorter for Coin Stack Box

Fortrend coin-stack sorter is an automated system to transfer wafers between coin-stack shipping boxes and process cassettes or SMIF pods reliably and safely without contaminating or damaging wafer surfaces.

The system identifies wafers, separators (interleaf paper), and cushion foam and sort them to designated locations automatically. It also incorporates wafer aligner for wafer ID registrations as required.

The system configurations offer standard vacuum or Bernoulli none contact type end-effectors to handle standards or special MEMS or thin wafers for optimal wafer protections.

Interleaf Paper and Foam

- *Fortrend Thin wafer sorter handles Standard wafer, Taiko wafer, Ultra-thin wafer, MEMS and Heavy warped wafer.*
- *Uniform holding force over entire end-effectors to minimize stress over wafer.*
- *High reliability Bernoulli End-Effectors to handle uneven wafer, warped wafer, interleaf paper and foam.*
- *No slip out design end-effectors.*
- *With flip arm robot to inspect back side as required.*
- *Smart indexing system for the height of paper, foam and coin box*
- *Material identification system capable of detect material type like wafer, paper, foam or box using CCD camera.*
- *Alarm, if inconsistent object found.*
- *Optional edge handling or vacuum pad pre-aligner available.*
- *Optional mini-environment with down flow gas filters to reduce cross and airborne contamination*
- *Top side or both sides OCR to read ID.*
- *Number of Recipe: Programmable*
- *Wafer protrusion detection*
- *Modular design minimizes adjustments, maintenance and downtime*

50~200mm LED Sorter

Features:

- Dual or Single arm Scara Robot
- Integrated Mapper on Robot Arm
- 50 mm to 200 mm Wafer sizes
- Tetra cassette stage design for 50, 100,150 and 200mm cassette without parts change.
- 2 to 5 Cassette stations, each cassette station able to accept multiple cassette sizes.
- Option to 14 stations – 2 layer design
- Optional long Z Axis robot, Z-stroke 450mm
- Optional Ergonomic cassette stage available.
- Pre-aligner (capable of detecting transparent, semi-transparent and opaque wafer)
- Option OCR reader
- Touch Screen GUI Controller
- E-Stop and EMO buttons
- Light tower
- Mini-environment with ULPA filters
- Ionizers

**Long Z Robot can
Cover 2 Layer Designs**

**Triangle Cassette Design
for 50,100,150mm Cassette**

300mm EFEM System Configuration
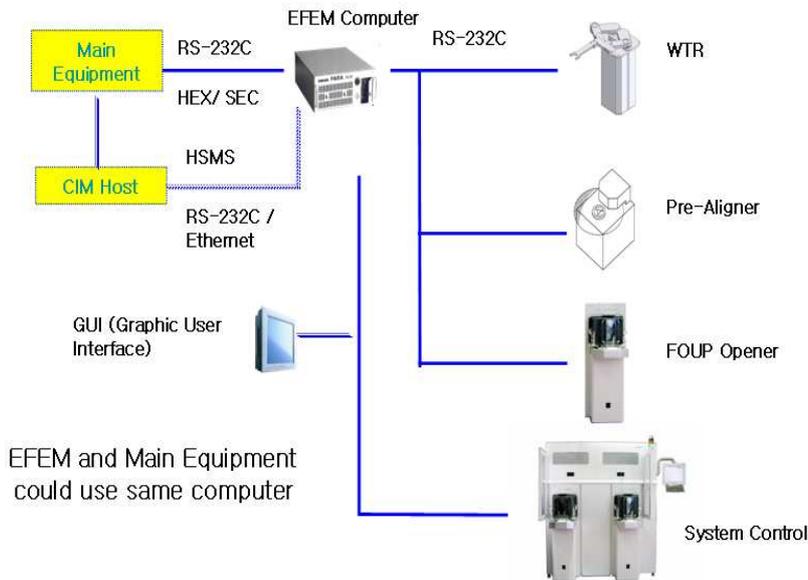
Classification	300mm EFEM Specification		
	2 ports	3 ports	4 ports
Size (WxDxH)	1,355x1213x2,000 mm	1,860x1213x2,000 mm	2,365x1213x2,000 mm
Weight	400Kg	600Kg	900Kg

Carrier	300mm FOUP (SEMI E47.1-0512 Compliance)
Cleanliness	Class 1@ 0.1 μm
Laminar Flow Recovery Time	Less Than 30 minute
Repeatability	± 0.1mm
Electric Supply	220V ± 10% (60Hz, 1Φ) 3 Wire + Ground
Acoustic Noise	Less Than 65db
User Interface	Serial RS-232C, Ether-Net (HSMS)
Communications	SECS Ⅰ / SECS Ⅱ / GEM
MTBF	More Than 8,000 hrs
MTTR	Less Than 2 hrs

200mm EFEM for ASM E2000

A ASM Authorized EFEM

Features

- ◆ *Class 1 Mini-environment with 99.9995% ULPA Filters and Fans*
- ◆ *Ionization bar*
- ◆ *Aluminum extrusion frame with stainless steel outer panel*
- ◆ *Operation GUI with 20" Flat Panel Display*
- ◆ *Windows 8 operation system or newer with SECS/GEM communication*
- ◆ *Quick docking with align pins to mount with ASM E2000*
- ◆ *GUI to open/close ASM door automatically*
- ◆ *Interlock sensor with ASM and CIM host*
- ◆ *Facility Requirements:*
  - ➢ *1~+PE 220V, 50/60HZ, 15A*
  - ➢ *CDA, 1cfm, 0.55~0.75mpa*
  - ➢ *Vacuum, 1cfm, -80kpa~ -100kpa*
- ◆ *Optional RFID reader/writer*
- ◆ *Optional E84 for AGV/ OHT*
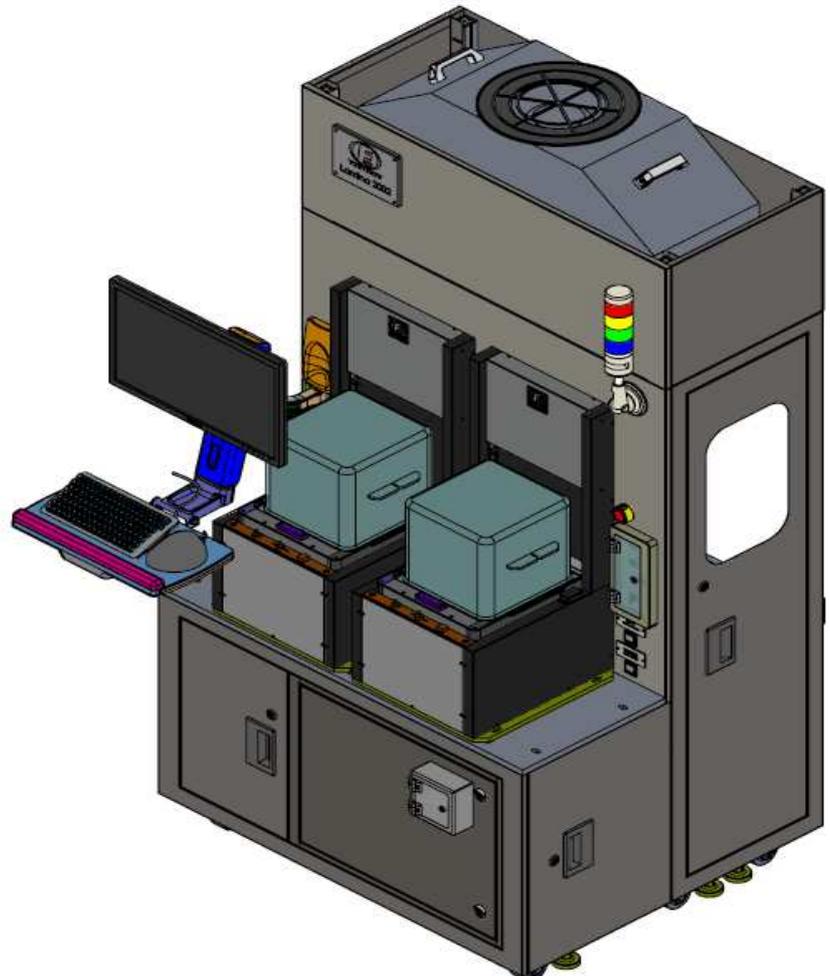
300mm FOUP Opener

- SEMI compliant E15.1, E47.1, E57, E62, E64, E83, E110
- RS-232 communication interface
- FOUP present and placement sensor with lamps
- Wafer protrusion sensor
- FOUP pinch point protection
- BEOL/FEOL lock out pin
- Compatible with all SEMI compliant 300mm FOUP's
- Compatible with OHT, AGV material handling interface
- Module Design for quick service swap-outs
- Cleanliness of class1 @ 0.1 micros
- High reliability

FO-3100

Classification		Specification
Carrier type		25-slot SEMI Standard 300mm FOUP
Dimension		472(W) x 493(D) x 1366(H)
Weight		56Kg
Mounting	Mounting point	900mm ± 10mm
	Bolting	ISO M8-6H
Cleanliness		Class1 @0.1 μm
Cycle time	With mapping	17 sec
	Without mapping	12 sec
Stroke		Y Axis: 50 mm (FOUP Move Forward and Backward)
		Z Axis: 410 mm (FOUP Door Up and Down
Communication		Serial RS-232, Parallel I/O
Cleanness		Class 1
Utility requirement		Power: 24VAC, 5A
		CDA: 0.6 MPa, 10LPM, Ø6 Air Tube
		Vacuum: Minimum -80kPa, 10LPM, Ø6 Air Tube
Option		RFID Reader
		Optical PIO Sensor
		Info Pad sensor
		MFC control N2 Purging
		AGV / PGV interface
		200mm adaptor

450mm FOUP Opener

FORTREND

- Compliant with SEMI Standard SEMI E154, E158, E159 & E144
- RS-232 communication interface
- FOUP present and placement sensor with lamps
- Wafer protrusion sensor
- FOUP pinch point protection
- Support Gas Charging for FOUP
- BEOL/FEOL lock out pin
- Compatible with all SEMI compliant 450mm FOUP's
- Compatible with OHT, AGV material handling interface
- Module Design for quick service swap-outs
- Cleanliness of class1 @ 0.1 micros
- High reliability

FO-4500

Classification		Specification
Carrier type		25-slot SEMI Standard 450mm FOUP
Dimension		635(W) x 625(D) x 1,455(H)
Weight		115Kg
Mounting	Mounting point	900mm ± 10mm
	Bolting	ISO M8-6H
Cleanliness		Class1 @0.1 μm
Cycle time	With mapping	20 sec
	Without mapping	15 sec
Stroke		Y Axis: 100 mm (FOUP Move Forward and Backward) Z Axis: 425 mm (FOUP Door Up and Down)
Cleanness		Class 1
Communication		Serial RS-232, Parallel I/O
Utility requirement		Power: 100~230VAC, 2A CDA: 0.6 MPa, 10LPM, Ø6 Air Tube Vacuum: Minimum -80kPa, 10LPM, Ø6 Air Tube
Option		RFID Reader Optical PIO Sensor Info Pad sensor MFC control N2 Purging AGV / PGV interface

Wafer Transfer Robots (Single/Dual arm)

Standard Robots

- Transfer 50~450mm Wafer (2" ~ 18")
- Clean room Application
- ODM or OEM Supply
- Single & Dual arm / Multi Blade Type
- Fast & Precise Motion Robot
- 0.1 micron meter CLASS 1 Cleanliness
- Various End-Effectors : Vacuum Blade, Edge Gripper
- Linear Track, Mapping Sensor (Optional)
- Customization available when requested
- Maximum 1,200 mm vertical Telescope stroke (Z-stroke).
- Up to 3-step telescopic design available

Dual Arm   **Single Arm**

Telescope Body (2 Step Robot)

300mm Robot – 2 Step   **450mm Robot – 2 Step**

Wafer Transfer Robots General Specifications

| Item		Specification
Wafer Size		50 to 450 mm
Motion Range	**R-axis stroke**	300mm to 600 mm (not including EEF length)
	T-axis	330 °
	Z-axis	200 to 450 mm (Single Z-Stage)
Speed	**R-axis**	800 mm/s
	T-axis	240 deg/s
	Z-axis	500 mm/s
Repeatability	**R-axis**	± 0.1mm
	T-axis	± 0.1deg
	Z-axis	± 0.1mm
Mini Rotation Diameter		Depending on the Arm and EEF length
Payload		0.2 ~2kg (depending on wafer size and gripper)
Motor		AC Servo motor
Cleanliness		Class1
Weight		About 28 to 68Kg
Mapping sensor		Option
Teaching Pendent		Option
MTBF		≥ 8,000 hrs
MTTR		≤ 2 hrs

1 + 5 Blade

1 + 1 Blade

Special Robot Application

LED Wafer Handling
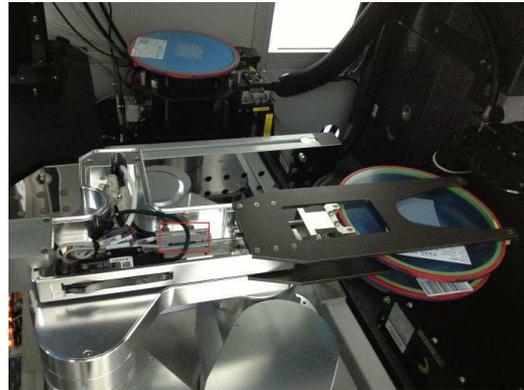
Blue Tap Handling – Wafer on Blue Tap

Wafer Flipper Options
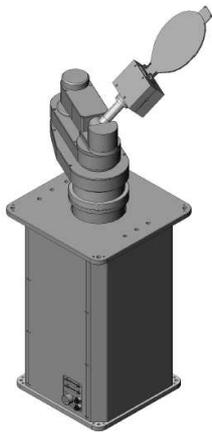
Perpendicular Flip

Parallel Flip
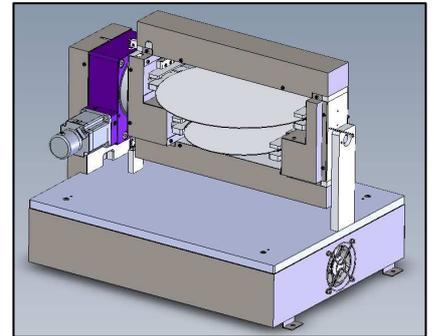
8''/12'' Wafer Flipper

Pre-aligner Options


LED Wafer

200mm Wafer

300mm Wafer

Customized Solutions

200mm Pod Inspection

Solar Cell Loader and Oven system
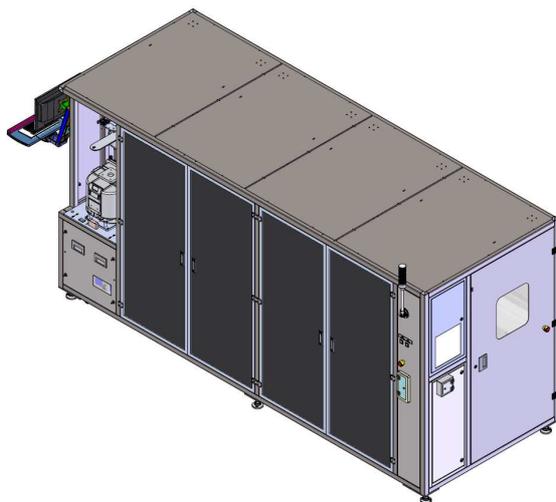
Mini FOUP Stocker

Customize Software Solutions

				Fortrend Engineering Corp
				Patent List
No.	Country	Patent	Filing Date	Title
1	USA	5,193,969	5/20/1991	Wafer transfer machine
2	USA	5,506,744	4/28/1994	Ionized airflow manifold for static reduction
3	USA	5,706,201	5/7/1996	Software to determine the position of the center of a wafer
4	USA	5,870,488	5/7/1996	Method and apparatus for prealigning wafers in a wafer sorting system
5	USA	5,934,991	2/1/1998	Pod loader interface improved clean air system
6	USA	5,885,045	3/11/1998	Integrated wafer pod-load/unload and mass-transfer system
7	USA	5,984,610	3/7/1995	Pod load interface
8	USA	6,086,323	6/29/1999	Method for supplying wafers to an IC manufacturing process
9	Taiwan	105,433	3/16/1998	Integrated wafer pod-load/unload and mass-transfer system
10	Taiwan	105,434	3/18/1998	Integrated wafer pod-load/unload and mass-transfer system
11	USA	6,610,993	6/21/1999	Load Port Door Assembly With Integrated Wafer Mapper
12	USA	6,013,920	11/25/1999	Wafer -mapping load post interface having an effector position sensing device
13	USA	6,193,459	3/12/1999	Integrated wafer pod-load/unload and mass-transfer system
14	USA	6,239,963	6/21/1999	Wafer support with electrostatic discharge bus
15	USA	6,396,072	4/3/2000	Load Port Door Assembly With Integrated Wafer Mapper
16	Taiwan	511,119	6/20/2000	Load Port Door Assembly With Integrated Wafer Mapper
17	USA	6,494,666	1/26/2001	Simplified and enhanced SCARA arm
18	USA	6,932,558	7/3/2002	Wafer Aligner
19	USA	6,616,034	9/9/2003	Radio Frequency Identification Device
20	Taiwan	I 228484	6/12/2003	Universal Reticle Transfer System
21	Europe	3,739,118	1/11/2005	Universal Reticle Transfer System
22	USA	7,318,697 B2	6/12/2003	Universal Reticle Transfer System
23	USA	2005013684 (A1)	7/14/2004	Single Reticle Transfer System Provisional Patent Application
24	Taiwan	發明第 I 300585 號	9/11/2008	轉塔式光罩管理系統 (Carousel Type Reticle Stocker)
No.	Country	Patent	Filing Date	Title

25	Taiwan	發明第 I 293939 號	3/1/2008	光罩盒搬運車 (Portable Reticle Transportation Cart)
26	Taiwan	新型第 M304619 號	1/11/2007	具識別及充氣裝置之氮氣櫃 (N2 Chamber with Lot Tracking Systems)
27	Taiwan	發明第 I 245225 號	12/11/2005	在製造環境下追蹤物品之系統及其方法 (Systems and Methods to Track Materials for Manufacturing)
28	Taiwan	新型第 M276318 號	9/21/2005	晶圓盒檢測機台 (Wafer Box Inspection System)
29	Taiwan	新型第 M272224 號	8/1/2005	半導體製程料號識別裝置 (Material ID Device for Semiconductor Manufacturing Process)
30	Taiwan	新型第 223405 號	5/1/2004	晶圓片推撥機構 (Wafer Seater Device)
31	Taiwan	新型第 217504 號	1/1/2004	晶圓片烘烤裝置 (Wafer Oven System)
32	Taiwan	新型第 217667 號	1/1/2004	雙軌式晶圓盒開盒機構 (Dual Track Wafer Pod Opening Device)
33	Taiwan	新型第 209032 號	8/11/2003	晶圓盒自動載入及開啟裝置 (Automated Wafer Cassette Transfer and Pod Opening System)
34	Taiwan	新型第 202968 號	4/21/2003	磁力牽引之晶圓盒泊靠裝置 (Magnetic Pod Moving Device)
35	Taiwan	新型第 198284 號	12/11/2002	可彈性擴張的定位裝置 (Elastic Inflation Type Positioning Device)
36	Taiwan	新型第 197981 號	11/21/2002	晶圓盒快速開啟裝置 (Fast Pod Cover Opening Device)
37	Taiwan	新型第 198752 號	11/21/2002	晶圓盒開啟裝置之承接面調整機構 (Pod Opener Mechanical Interface Device)
38	China	发明 200910010033.3	9/8/2010	翻转式晶圆自动传输装置
39	China	发明 200910010030.X	9/8/2010	旋转式晶圆自动传输装置
40	China	发明 200910010032.9	9/8/2010	紧凑式晶圆自动传输装置
41	China	新型 200920010067.8	12/30/2010	平移翻转式晶圆自动传输装置
42	Taiwan	新型第 M376557 號	3/21/2010	晶片間距轉換裝置 (Chip space converter)
43	Taiwan	新型第 M389928 號	10/1/2010	光罩儲存器 (Reticle storage)
44	Taiwan	新型第 M603197 號	10/21/2020	冷卻裝置及使用該冷卻裝置之真空烤箱 (Cooling device and vacuum oven using the cooling device)
45	Taiwan	新型第 M604058 號	11/11/2020	輸送模組及使用該輸送模組之設備前端模組

				(Conveying module and equipment front-end module using the conveying module)
46	Taiwan	新型第 M604970 號	12/1/2020	自動化真空烤箱設備模組 (Automatic vacuum oven equipment module)
47	Taiwan	新型第 M630402 號	8/1/2022	邊緣夾持之晶圓翻轉裝置 (Wafer flipping device by holding edge)
48	Taiwan	發明第 I786019 號	12/1/2022	晶圓承載座及其使用方法 (WAFER HOLDER AND METHOD OF USING THE SAME)
49	Taiwan	發明第 I799261 號	4/11/2023	具晶圓承載座之上下料自動化作業設備 (AUTOMATIC LOADING AND UNLOADING APPARATUS WITH WAFER HOLDER)

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