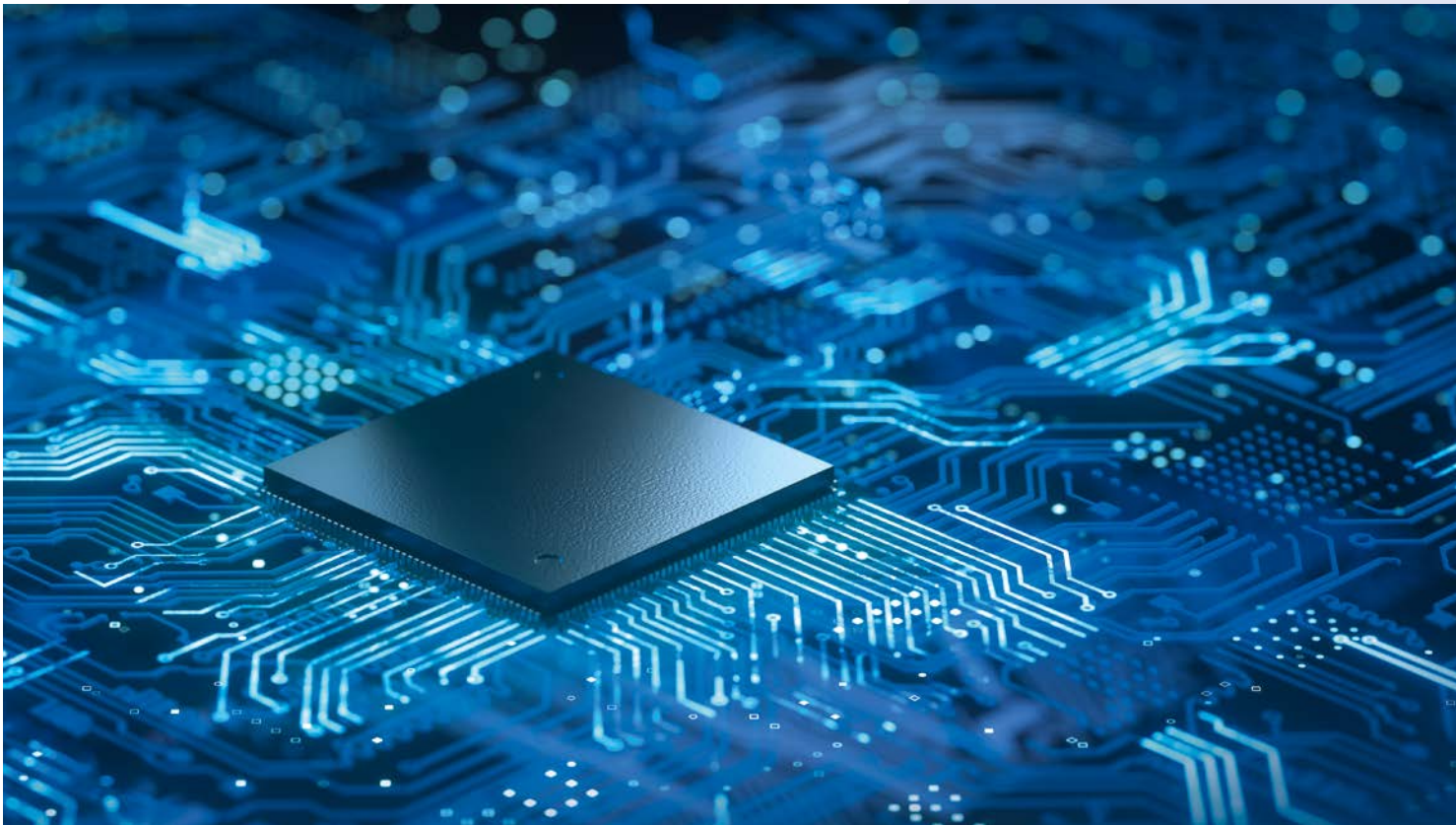




INNOVATIVE SOLUTIONS FOR SEMICONDUCTOR MANUFACTURING



REUSE. REFURB. RENEW. RECYCLE.

Welcome to PTW

**PTW
PRODUCT
OFFERING**

**CUSTOMER
SERVICE**

**TOOL
REFURBISHMENT**

**NEW TOOL
DEVELOPMENT**

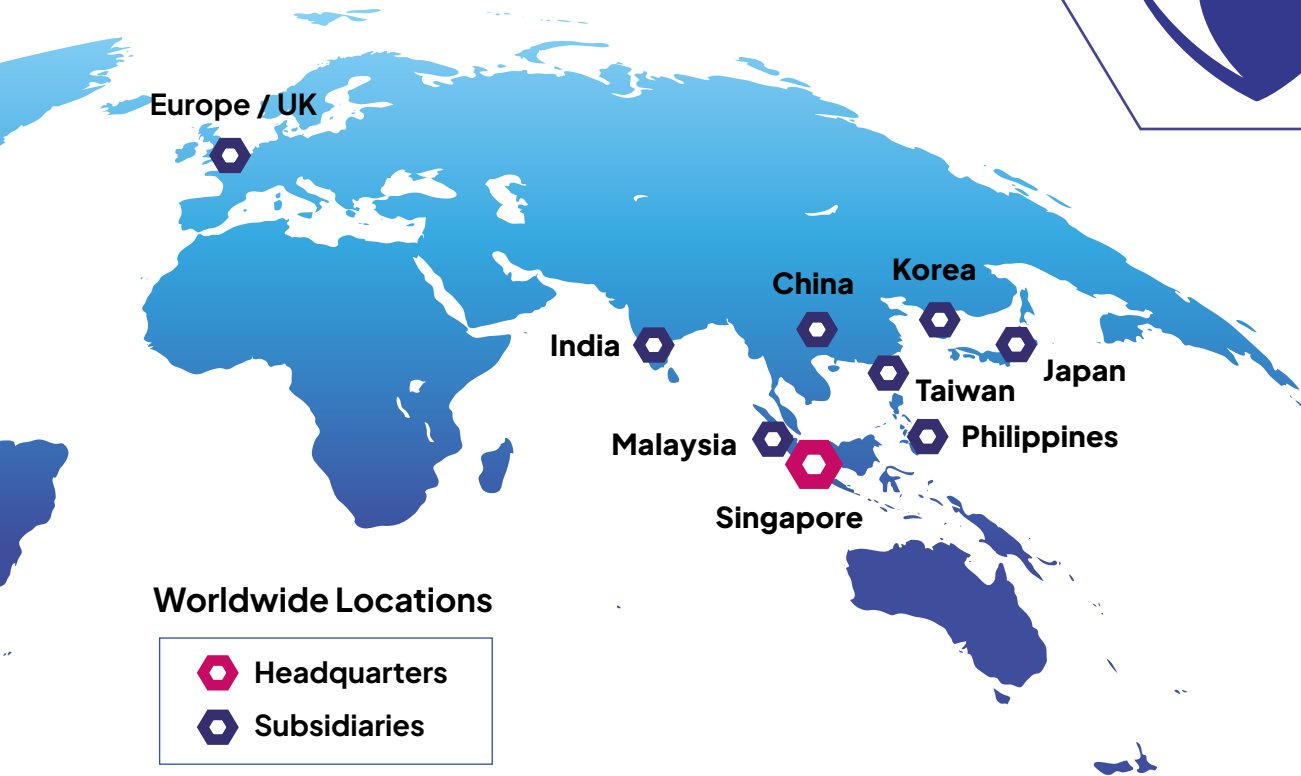
**LEGACY
TOOL SUPPORT**

ENGINEERING

**TOOL
TRADING**



United States



For more than 15 years, PTW GROUP has been a valued partner for the support of legacy FABs. We have been focusing efforts for more sustainability through reuse, refurb, renew and recycle programs. Now we are developing new tools allowing you to reuse your qualified processes and recipes as well as supporting new process development.

We are ready to collaborate with you on addressing your challenges and needs. Our end to end support includes onsite service, part level repair and exchange, upgrades to entire system reconfiguration and refurbishment, new tool development as well as specialized engineering projects.

Let us support you!

**OEM
REPRESENTATION**

About PTW GROUP



” OUR VISION

To be the preferred partner for innovative and reliable solutions in semiconductor manufacturing ”

We extend the lifetime of semiconductor fabs with tailored, sustainable, and cost-effective solutions for legacy tools and processes – from service and repairs to upgrades and drop-in replacements, using both refurbished and new equipment.

Range of Services



Legacy Tool Support

- Spare parts (OEM new, repaired or refurbished)
- Replacement for discontinued parts
- Upgrades and exchange parts program



New Tool Development

- Developing new tools with the goal to reuse qualified recipes or to address challenges of the future



Engineering

- Development of customized solutions



Tool Refurbishment

- Sales of refurbished tools
- Reconfiguration
- Installation
- Warranty



Tool Trading

- Buy and sell "As is, where is"
- Bulk buy
- Target purchases



Customer Service

- Corrective maintenance
- Preventive maintenance



OEM Representation

- Sales and marketing
- Warranty and service support
- Spare parts management

SEZ Product Range

PTW PRODUCT OFFERING

**With Over 25 Years of Experience
We Are Able to Offer:**

- Tool refurbishment
- Installation, tool move & training
- Corrective & preventive maintenance
- Specialized upgrades

**Our Specialty is Tool Modifications for
Thin Wafer Handling.**

Refurbishments are carried out in our refurbishment centres and are offered as turnkey solutions.

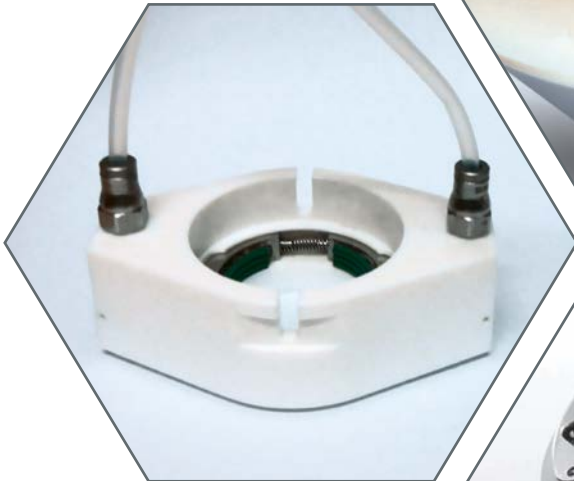
We also offer conversions from 6" to 8" (starting with 200-series tools) including installation and training.



SEZ Product Range

Chuck Brakes ▼

Available for 100-series
and 200-series



◀ Chucks & Chuck Refurbishment

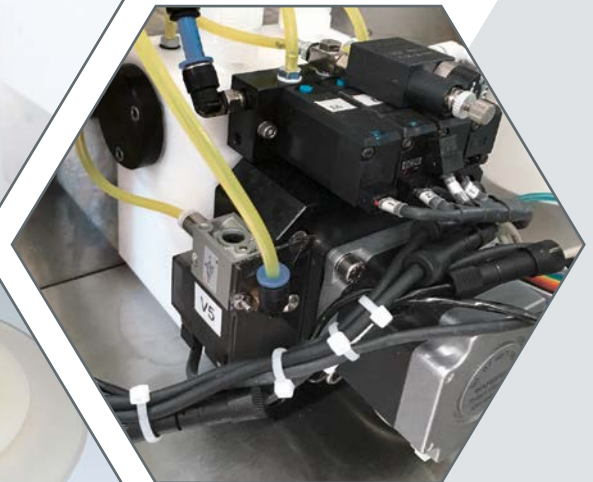
Standard pins, NC-chuck pins,
pinless, undercut and step chucks,
tightened OEM specifications.
Each chuck assembly is checked
before delivery to meet our
tighter tolerances.

New Bearing Units ▶

2nd source new for all models.
Available in exchange program or as
part of a refurbishment service.



▼ Motors & Pump



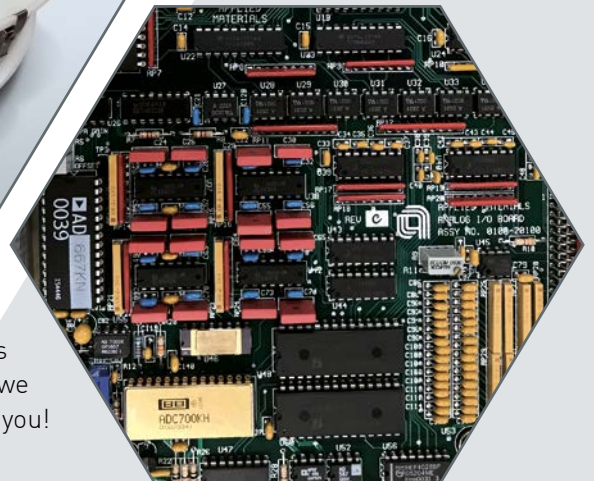
Process Chamber ▶

Available in 5", 6", 8" & 12".
Either available as complete
chambers or spare parts.
Alterations and desired
improvements possible.



PCB Repairs ▶

We offer repair for SEZ's
PCB boards. Simply send us
your non-working PCB and we
will repair them for you!



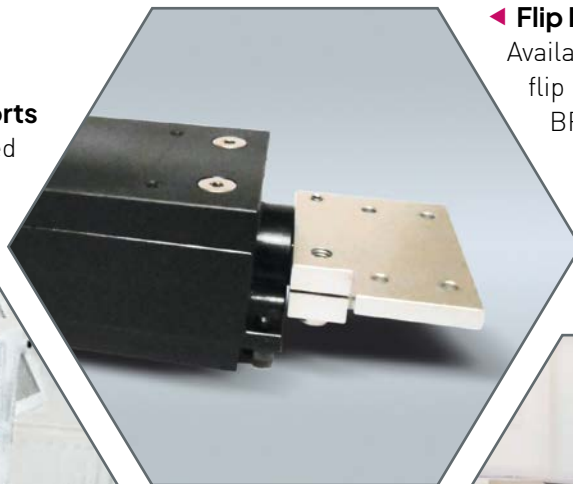
SEZ Robot & Handling

PTW PRODUCT OFFERING



◀ Eco Gripper

Available in 5", 6", 8" & 12",
with Bernoulli, standard
eco or double eco, spare
parts available



◀ Flip Modules

Available as new or refurbished
flip modules, refurbishment of
BROOKS robots



▼ SEZ Robots

Available as refurbished
robots or as part of a
refurbishment program



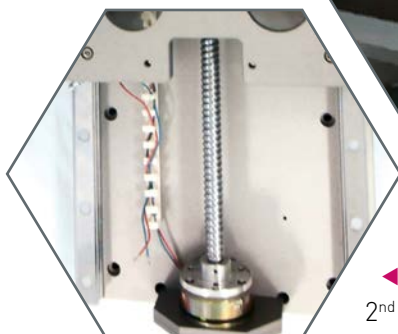
▼ 12" Load Ports

Available as refurbished
or as part of an
exchange program



◀ Bernoulli Gripper

Available in 6",
8" & 12", new or
refurbished end
effectors and grippers



◀ New Elevating Unit

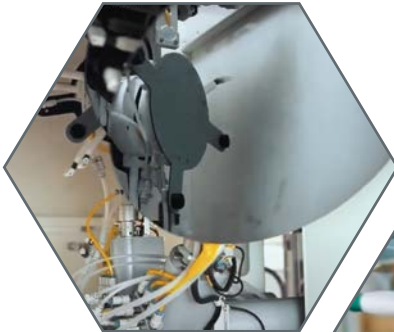
2nd source new for all models,
available in exchange program
or as a refurbishment service

Further Available Parts

- Single & double-sided end-effector
- Lock nuts (bearing units)
- Ball bearings
- Preflush manifold
- Labyrinth seal
- Chuck pins
- Distancing rings
- Pinless top-plates

Further Upgrades

- Improved suck back box for ultra-high viscosity medias
- Pump upgrade to replace NIPPON pillar pumps enabling:
 - Better wafer to wafer uniformity
 - Significant cost reduction
 - Important maintenance time reduction
 - Speed pack upgrade for elevating units



SPINTEC 203/223

PTW PRODUCT OFFERING

PTW SpinTec's experts, the former core team of SEZ, developed new process applications as well as state-of-the-art performance systems for Single Wafer Wet Etch Equipment.

Key Applications

- SiC, Si, GaAs, advanced substrate processing
- Thin wafer processing (warped wafer)
- Particle, polymer and residue removal
- Backside/bevel cleaning
- Silicon substrate thinning/stress relief

Application Range

- Substrate etch
- Film etch
- Metal etch
- Surface clean
- Bevel etch & clean
- Backside film removal
- Post CMP clean
- Pre-EPI clean



SPINTEC 203/223

The Highest Level of Process Engineering for Single Wafer Wet Etch Equipment

Components & Design

- Improved design:
Stäubli handling robots
- Bernoulli handling with
wafer alignment
available as an option
- Spare parts consignment
programs
- No more part
obsolescence issues

Plug and Play Solution

- “Copy and Paste” tool
replacement or addition
to existing fleet
- Recipes compatible
with existing systems
- Same footprint and
facilities connections
- Less requalification



Performance

- Uptime guarantee of
95 % with service
contract
- Reduced handling time:
Higher throughput
- Improved wafer
tracking
- State-of-the-art
safety system



***Committed to process technology
innovation, SpinTec is providing high
performance as well as productivity
and economic solutions for customers.***

SEMITOOL

PTW PRODUCT OFFERING

Tool Types

- Raider
- Storm
- Spectrum
- SST
- SAT

Expertise

- Tool refurbishment
- Installation, tool move & training
- Corrective & preventive maintenance
- Spare parts





Exchange Parts

- Motors
- Chamber control block
- DYNATRONIX power supply
- PCB boards

Part Repair / Refurbishment

- Actuator refurbishment
- Gold boxes
- DYNATRONIX power supply
- Lift rotate module
- Semitool Raider robot
- Ozone generator refurbishment

HITACHI SEM

PTW PRODUCT OFFERING

Offerings

- Tool refurbishment
- Tool upgrades
- Installation, tool move and training

Expertise

CD-SEM

- 7, 8 & 9-series
- CG 4000

FE-SEM

- S 4-series
- S 5000 & 5500
- SU 8000 & 8200

Hi-SEM

- TM 1000 & 3000/30
- S 2700 & S 3-series
- SU 1510 & 3500



Refurbishment

Controllers

- HV controllers
- Stage & EVAC controllers

Robot and handling

- Rotation arm units
- TAZMO robots
- Aligners

EVAC System

- Ion pumps
- Turbo pumps
- TMP controllers
- Vacuum switch
- EVAC board
- EVAC display
- EVAC power supply
- Gas filter

Valve Assy

Stage

- Amplifier sensor
- DEF power supply
- Stage laser
- Lens power supply
- Mini E power unit
- SPM sensor

Upgrades

- SiC upgrade
- Datastation upgrade

Electron Optics System

- OBJ auto
- OBJ manual control
- OM camera
- Lamp house
- EO cont board

Services

- Corrective maintenance
- Preventive maintenance



Coater/Developer

PTW PRODUCT OFFERING

Tool Types

- SÜSS ACS 200 & 300
- FAIRCHILD FALCON
- SCREEN

OEM: New and Second Source Parts

- Motors
- Chucks and bowls
- Sensors
- Media valves
- SM and Libbert cards

Refurbishments and Repairs

- Hotplate refurbishment
- Spinmotor and controller
- Robots
- End effectors
- Complete coater and developer modules
- Gear unit process arm refurbishment
- Spin chuck repair
- Wafertec pump repair



Coater/Developer



Parts

- Spin motors
- Load port adapter
- Flow control
- End-effector assembly and blades
- Pumps
- Process bowls
- Process arm custom nozzles
- Gear unit process arm

Refurbishment

- Coater/developer module
- Hot plate/cool plate
- Robots

Coater/Developer Upgrades

PTW PRODUCT OFFERING

Hot Plate Wafer Tilt Detection

- Fully integrated system for SÜSS coaters
- Detects foreign material on hot plates
- Alarms if a wafer is not positioned correctly

Wafer Edge Detection

- Fully integrated system for SÜSS coaters
- Vision sensor mounted on EBR arm
- Wafer centering control before process
- Wafer edge control after coating & wafer edge removal
- Less rework, less scrap



Coater/Developer Upgrades

INNOPUMP

Resist Pump Upgrade

- Fully integrated system for SÜSS with controlled and logged flow rates
- INNOPUMP micro-controller: high accuracy for low & high viscosities
- Cost reduction, bubble detection, prevents rework, reduced maintenance

INNOSPRAY

Spray Nozzle Upgrade for Polyimide Developer Systems

- Fully integrated system for SÜSS (coming soon for TEL & DNS)
- Easily adjustable nozzle, drop size and spray angle

- Cost reduction up to 50 %: minimal waste, misting & overspray, reduced extraction and process time, no N₂ needed



Robot Measurement Cassette

PTW PRODUCT OFFERING

Innovative

- Reduction of wafer scratches, chips and breakages
- To replace individual perceptions based on eyesight

Measurement Functions

- Measurement resolution: 0.01 mm or 0.01 %
- Cassette levelling

Slot 1

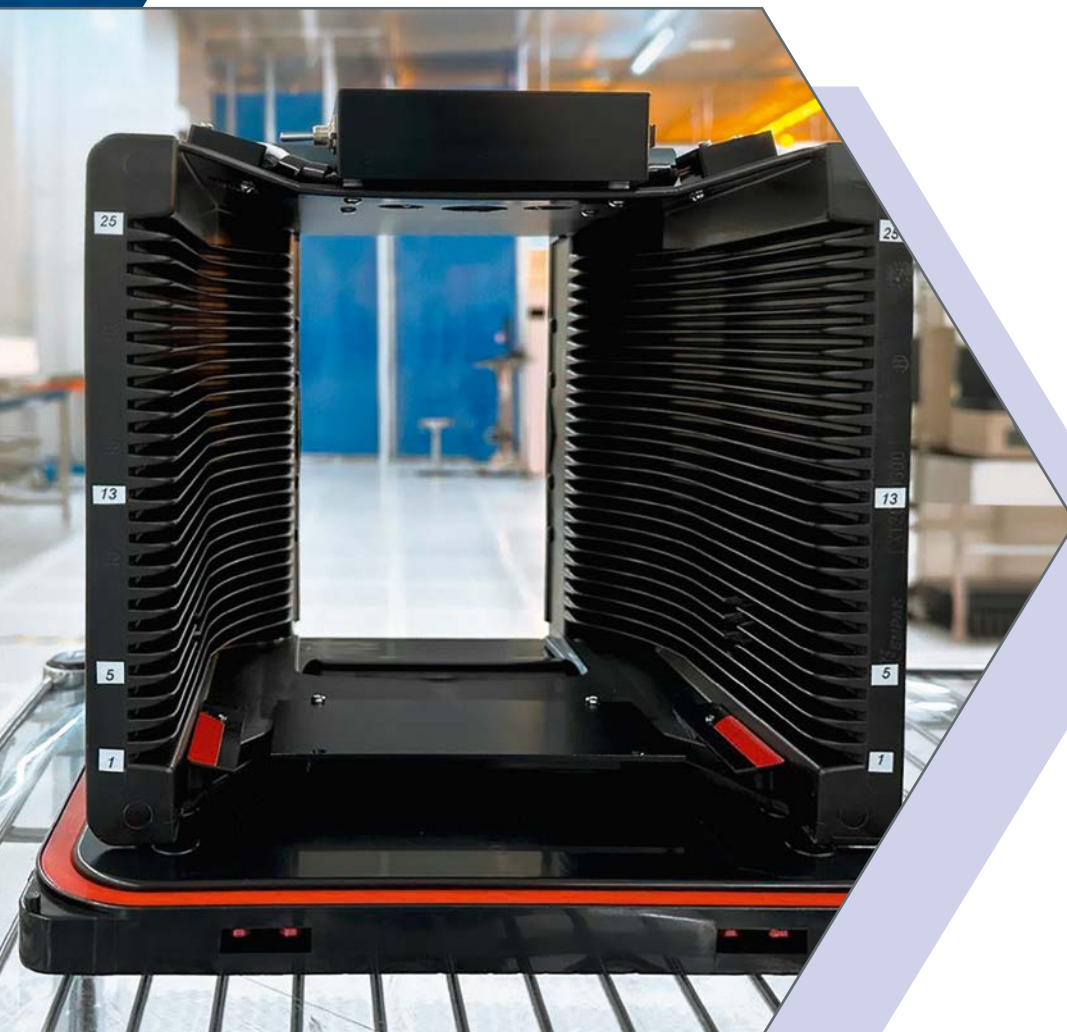
- Position of wafer

Slot 5

- Paddle level
- Tilt of wafer

Slot 25

- Lift of wafer



Robot Measurement Cassette

Preventive Maintenance

- Tracking of robot drift to set overhaul intervals
- Robot calibration added to preventive maintenance

Availability

- Available in a wide range of wafer sizes
 - 6" (150 mm)
 - 8" (200 mm)
 - 12" (300 mm)
- SMIF compatible



Robots

PTW PRODUCT OFFERING

Product Range

ATM & VTM Robots,
Pre-Aligners, Drive
Box & Controllers

ATM

- PRI
- Rorze
- Shinko
- Yaskawa
- Kawasaki
- Brooks
- Genmark

VTM

- PRI
- Yaskawa
- Brooks

Expertise

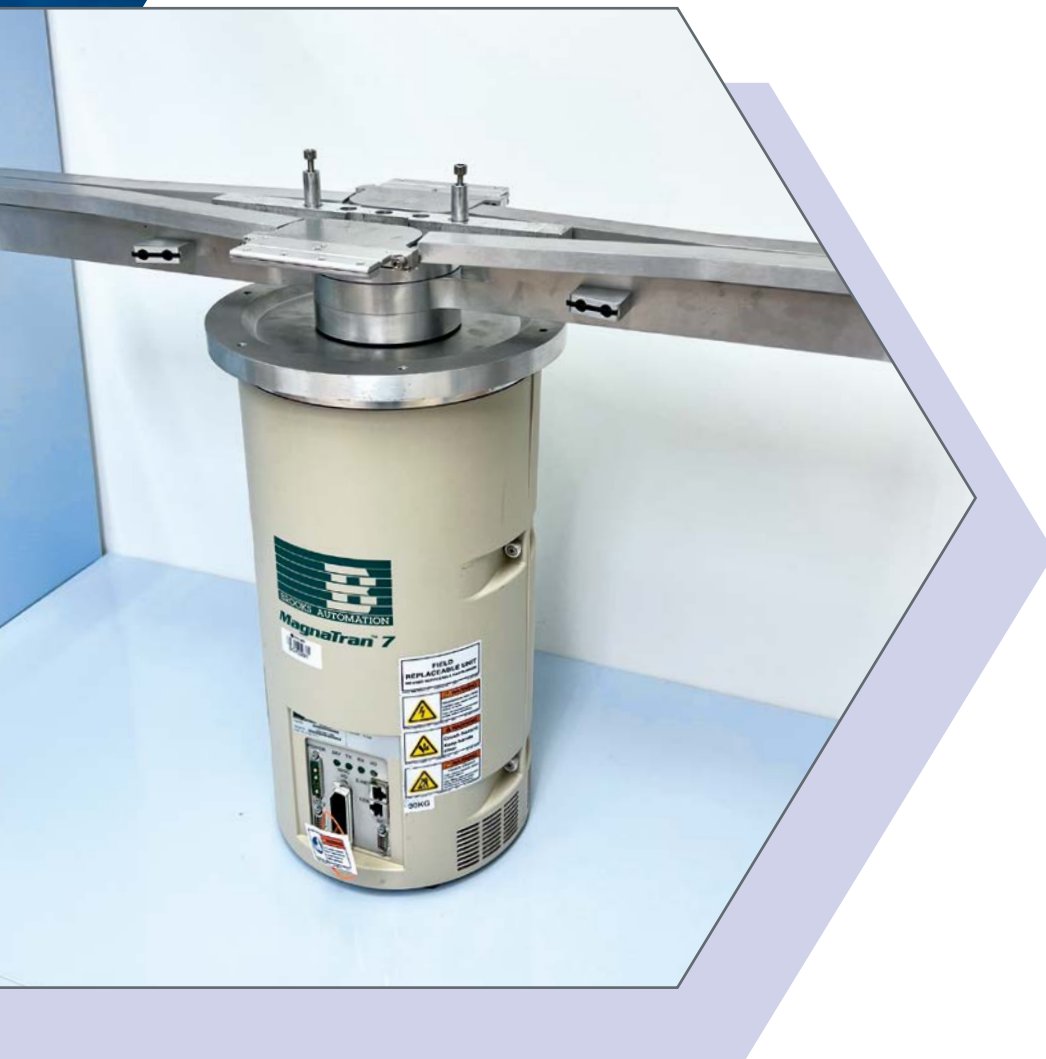
- Refurbished robot sales
- Robot refurbishment & repairs
- Spare parts, parts refurbishment & exchange
- Robot upgrades

Field Service

- Corrective & preventive maintenance
- Installation and de-installation
- Teaching & fine tuning
- Inspection & testing

Cost Savings

- Long life time
- 6 months warranty
- Reduced cost compared to buying new



Stage Laser Refurbishment

PTW PRODUCT OFFERING

Expertise

HP - Agilent - Keysight 5517-Series

- 5517A (1.5 - 1.9MHz)
- 5517B (1.9 - 2.4 MHz
NIKON & ASML
Lithography,
HITACHI CDSEM)
- 5517C (2.4 - 3 MHz
NIKON & ASML
Lithography,
AMAT compass)
- 5517D (3.4 - 4 MHz
NIKON & ASML
Lithography)
- 5517DL (4.4 MHz
NIKON Lithography)
- 5517D & DLC300 (> 5.1
MHz ASML Lithography)

Inspection

- Initial testing: start-up,
check for locking
signal, reference
frequency, alignment...

- Troubleshoot power
signal & control/
feedback circuit
- Determine whether
the laser is worth
refurbishing

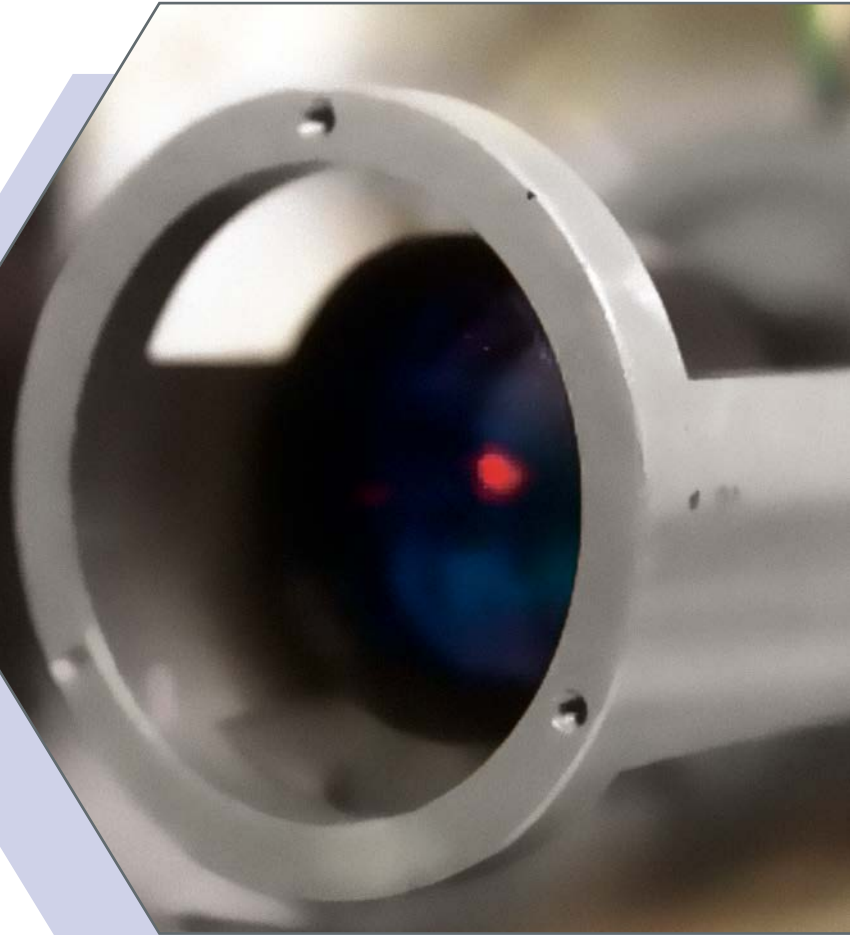
Refurbishment

- Replacement of
power circuit
electrolytic capacitor
- New tube installation
- Power and
frequency tuning
- Lens and mirror
cleanup and alignment

Testing

Laser Should Power-Up and Lock within 10 minutes

- Numerous power
output readings
- Reference frequency
reading
- 8-hours stability
testing in
interferometer setting
- Alignment check



Ozone Generator

PTW PRODUCT OFFERING

Product Range

Repairs & Overhaul for a Wide Range of Generators and Sensors

- MKS & ASTEX:
AX 8200, 8400 & 8500-
series, SEMOZON
- IN USA & TELEDYNE
- Ozone Sensors &
Controllers

Cost Savings

- Cost savings from
the reuse of the
Ozone cell
- Same specifications
as OEM
- Fast lead time
- 6 months warranty

Overhaul Process

- Initial cell inspection &
disassembly
- In depth cell cleaning &
repair
- Metallic & ceramic
electrodes replacement
- Cell reassembly, system
reassembly & testing

Testing Process

- Bench test to ensure
OEM performance
standards
- High voltage vacuum test
- Electronic board test &
component repair



Digital Gradient Filter

PTW PRODUCT OFFERING

Product Range

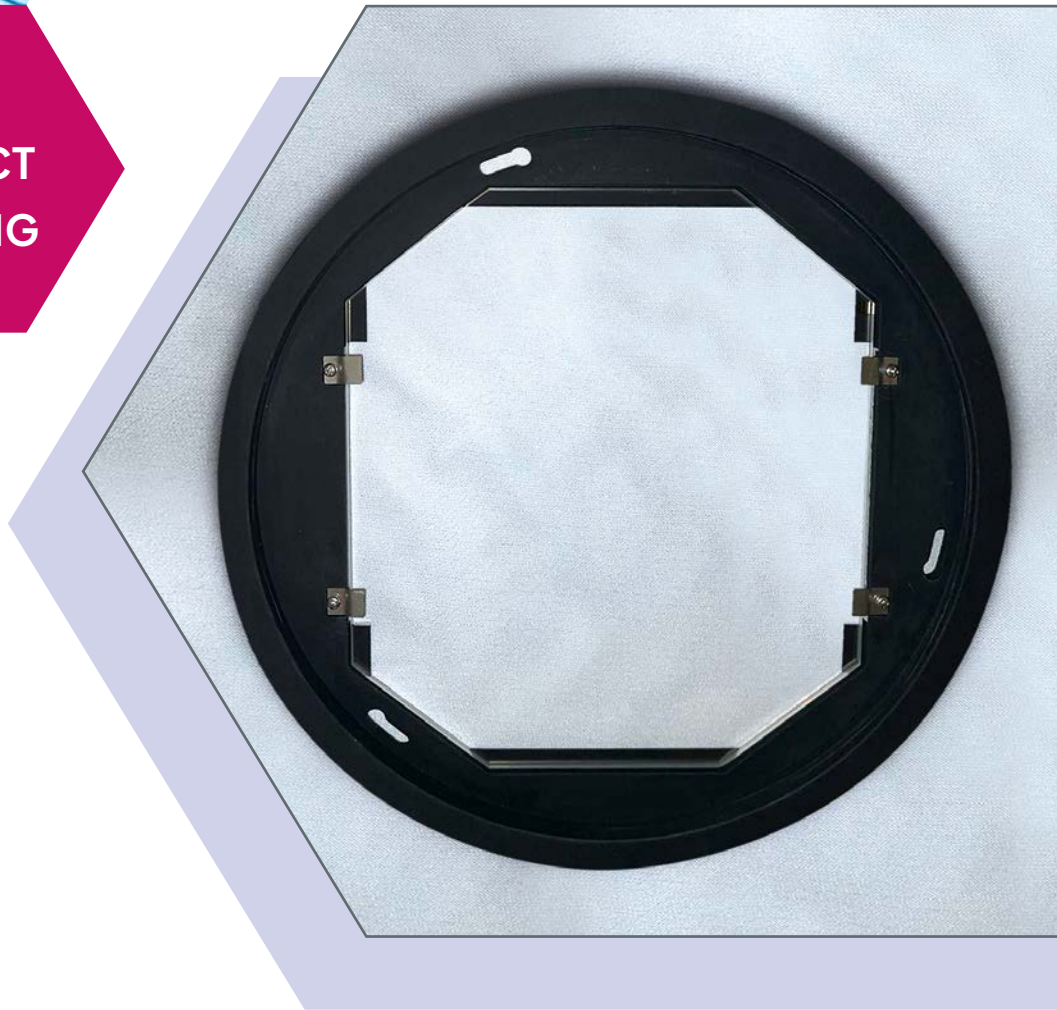
- Digital gradient filter for all stepper & scanner models (300 mm, 200 mm & 150 mm)
- Including I-line customized DGF and immersion type special DGF

Functions

- Installed for better CD & optical projection uniformity
- Prevents UV light from going directly toward the projection lens

Compared to OEM

- Cost effective solution
- 2/3-year lifetime depending on tool degradation
- Shorter delivery time:
 - PTW: 4-8 weeks from simulation data confirmation
 - ASML special UNICOM or DGF: 4-8 weeks
 - NIKON & CANON special RPF: 52 weeks
- Designed for solving important variation in light uniformity and to work under low light intensity
- Better slit uniformity (SLU %)



PTW PRODUCT OFFERING

Tool Types

- Furnace A400 - A412
- Epitaxy E2000 - E3200
- Injector
- Waferwand
- Compumotor driver

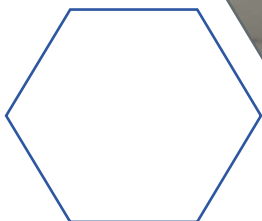
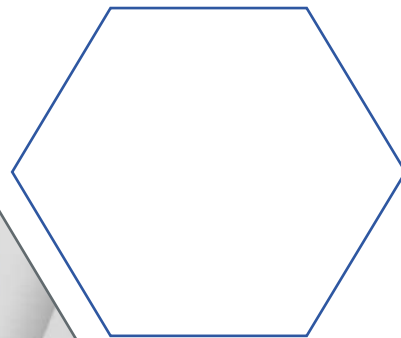
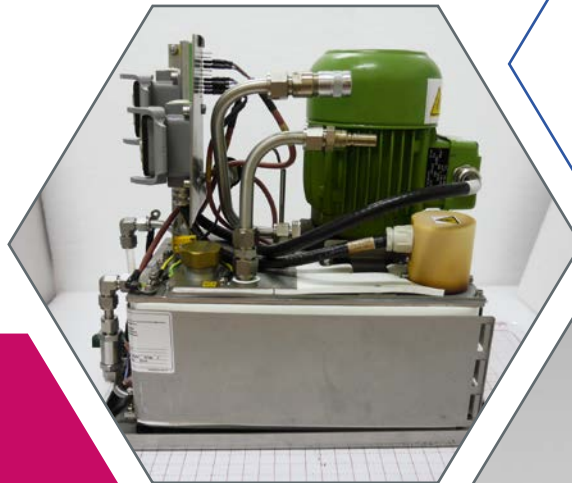
Product Range

- PCBs, including CPU & Foxboro boards
- Repair LVC-414 controller
- Reflector
 - Different reflectors available
- Thermocouple
 - The larger outside diameter of the quartz ensures a 20-40 % longer lifetime



Upgrades

- Gear box
- Add in water leakage sensor
- Retrofit of TCF/TCU cooling system
- Zirox O₂ analyser
- Galden coolant upgrade (TCF)



Helios Technical Services



HELIOS TECHNICAL SERVICES
SEMICONDUCTOR DIVISION

PTW PRODUCT OFFERING

Scorpion Robot Arm

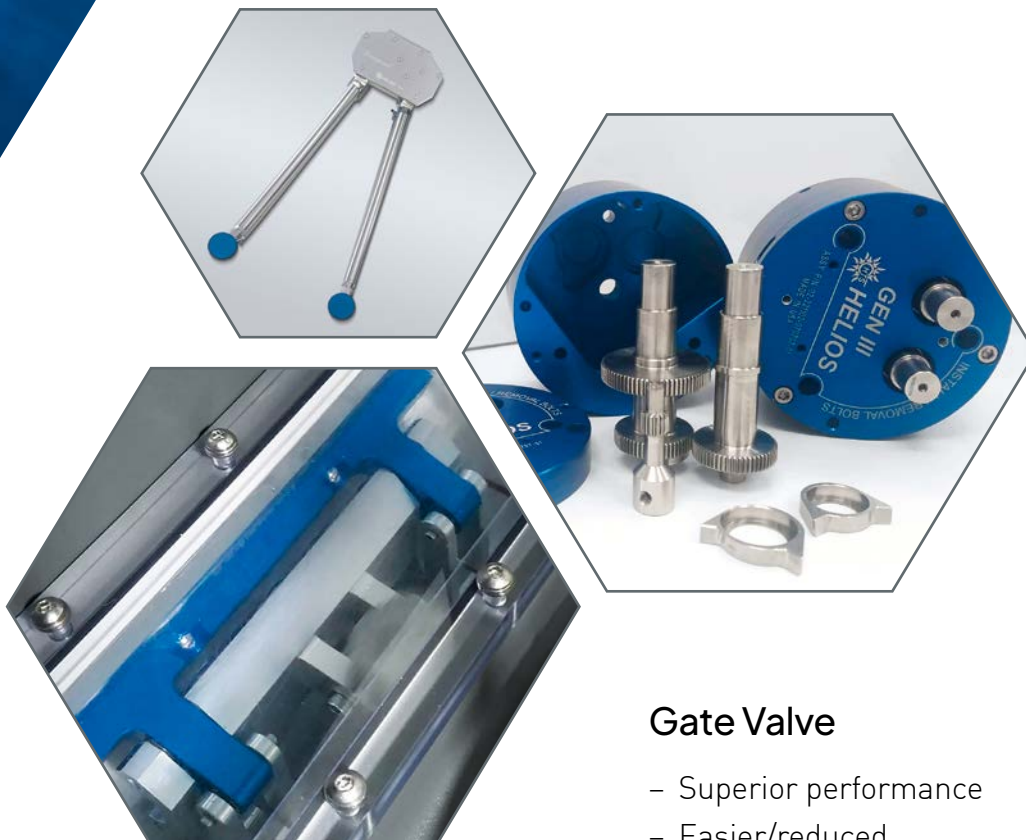
- Effectively eliminates arm sag
- Effectively eliminates arm leak
- Designed to substantially reduce particles
- Refurbishable

Wafer Handling (WHC) Gear Box

- Effectively eliminates “side-to-side” arm movement
- Designed with precision gearing for movement and long life
- Refurbishable
- Drop in replacement

Gate Valve

- Superior performance
- Easier/reduced maintenance
- Reduced cost of consumables



Helios Technical Services



Injectors

- Accurate flow across working range
- Repeatably and predictably
- Engineered in 'zero' for in-fab calibration



H2 Detector and Sense Heads

- Modern, robust system
- Heads designed to be replaced without flange (cost effective)
- Drop in replacement, extremely reliable

TC Sentry System

- Detects breach ("hole") in thermocouple sheath
- Integrated with the tool for warning/alarm
- Utilized Conax TC's
- Positively impacts yield

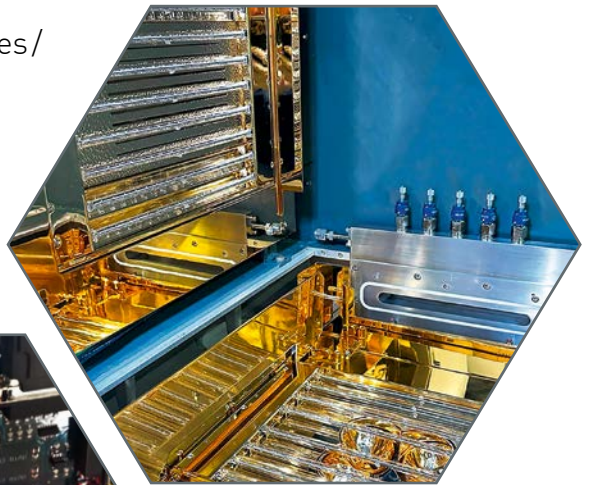
Helios Technical Services



PTW PRODUCT OFFERING

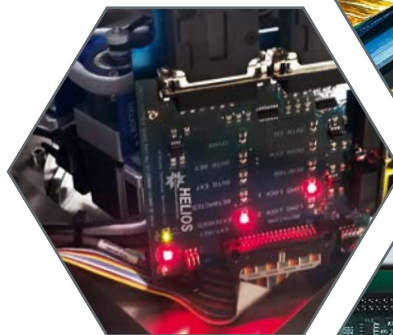
Reactor Gold

- All reactor components available
- Certified gold plating (global standard)
- Cost effective, short lead times/availability



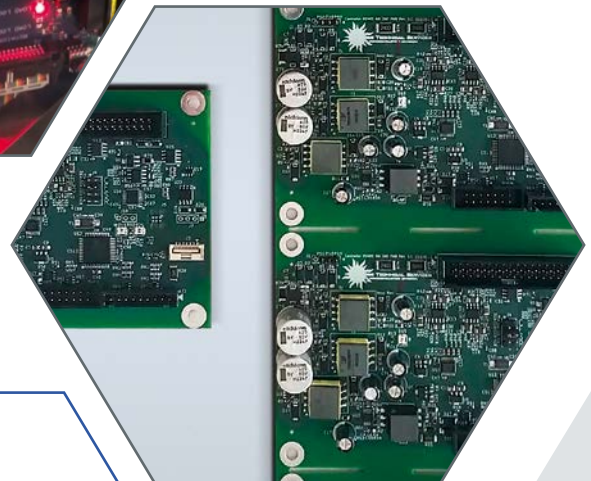
Merlin Wafer Handling System

- Complete replacement of OEM wafer handling system
- 2 speed control for faster movement
- Includes maintenance pendant
- Seamless communication with OEM software



Temperature Control Board

- Direct replacement for Foxboro temperature control board(s)
- Modern architecture and components
- All zones (C,F,S,R) selectable on each board (no EPROM)



PTW PRODUCT OFFERING

Wuxi Zhuohai Technology was established in 2009 and has been dedicated to the niche field of semiconductor front-end metrology equipment. Its main products include front-end metrology equipment, core components, and related technical services, providing customers with comprehensive solutions in the field of inspection and metrology equipment.



Refurbished Equipment

- Bright-field defect
- Dark-field defect
- Overlay
- Film thickness
- Particle
- Auto optical microscope
- Review SEM
- Stress
- Profiler
- E-beam inspection
- FESEM

Wuxi Zhuohai Technology



**PTW
PRODUCT
OFFERING**

Laser Module (New / Refurbish)

Laser Type	Power	Module	Equipment Type
ZH-Advanced 488	75 mW	AIT II, AIT XP, AIT XP+	Dark-field defect
	30 mW	6200, 6220, 6400, 6420, SP1 TBI	Particle
	30 & 75 mW	SP1 DLS	
ZH-Advanced 365	90 mW	AIT UV, AIT XUV	Dark-field defect
ZH-Advanced 355	350 mW	SP2, SP2XP	Particle
	1 W	9000	Dark-field defect
	2.5 W	9100, 9110, 9120, 9130, 9150	
	3.75 W	9550	



New R&D Equipment (4" / 5" / 6" / 8" / 12")

- 4-point probe sheet resistance
- Film stress
- Stylus profiler
- Spectrum reflection
- Particle
- FRT
- Laser acoustic

PTW
PRODUCT
OFFERING



Miyatsu provides innovative manufacturing solutions for semiconductor equipment.

Leveraging decades of expertise in the semiconductor equipment industry, we deliver state-of-the-art tools based on the latest technologies. Our experienced field service engineers offer fast and precise support, helping customers resolve challenges effectively.

Furthermore, with cleanroom facilities, cutting-edge inspection equipment, and a highly skilled technical team, we continuously pursue innovation and deliver new value to the semiconductor equipment industry.

Miyatsu



PTW PRODUCT OFFERING

Manufacturing Services

Miyatsu specializes in providing high-quality and reliable OEM manufacturing services in the semiconductor equipment industry, meeting a wide range of customer needs.

With state-of-the-art facilities and a highly experienced team, we pursue excellence and serve as a trusted partner dedicated to fulfilling our customer requirements.



Product Lineup

This technology efficiently removes photoresist, a masking material essential for forming circuits on semiconductor wafers. It offers customizable functionality that can be flexibly adjusted to suit a wide range of applications.

Additionally, it supports wafer sizes from 150 mm to 300 mm, providing excellent versatility.

Features

- Yield Improvement:
Low-damage plasma ashing minimizes wafer damage
- High Reliability:
PLC control reduces issues related to PC model changes and HDD failures
- Space-Saving Design:
Reduced installation footprint enhances efficiency
- High Throughput:
Optimized process and transfer robot for increased productivity
- Enhanced Communication:
Ethernet wiring and noise countermeasures improve performance
- Cost Reduction:
Achieved with a compact control rack

6" and 8" Ashers

	MG6500R	MG8500R	MG200
Process Wafer Size	150 mm (6") optional 125 mm (5")	200 mm (8")	
Process Method	Axial Barrel Method		Single Wafer
RF Power Supply	1 kW 13.56 MHz Auto Tuning	2 kW 13.56 MHz Auto Tuning	3 kW 27.12 MHz
Process Gas	O ₂		O ₂ , N ₂ , Ar, (CF ₄)
Purge Gas	N ₂		
Process Step	3 Step (128 Recipes)		20 Step (100 Recipes)
Chamber Number	Cylindrical • Vertical x 1		2
Wafer Transfer Unit	Vertical Operating Cassette Elevator Finger Suction-Type Clean Robot		Cassette Loader (SMIF or OPEN) 25-finger Atmospheric Transfer 2-finger Vacuum Transfer Robot
Throughput	>50/H		>130/H
	Our Standard Evaluation Positive Photoresist		
	t=1.0 um		t<2.4 um
Utility	Power Supply: Φ 3 200 V Vacuum Pump: 10,000 l/min O ₂ : 0.2 MPa, N ₂ : 0.3 MPa CDA: 0.5 MPa Finger Suction: -80 ~ -60 KPa	Power Supply: Φ 200 V Vacuum Pump: 10,000 l/min O ₂ : 0.2 MPa, N ₂ : 0.3 MPa CDA: 0.5 MPa Finger Suction: -80 ~ -60 KPa Water Cooling: 6 l/min Under 0.5 MPa	Power Supply: Φ 200 V Vacuum Pump: • Process Chamber: 5,000 l/min x 2 • Load Lock Chamber: 1,400 l/min x 1 O ₂ : 0.1 MPa, N ₂ : 0.1 MPa CDA: 0.5 MPa Water Cooling: Over 13 l/min Under 0.5 MPa
Main Body (mm)	600 W x 1300 D x 1780 H	850 W x 1200 D x 1950 H	980 W x 2058 D x 1910 H
Control Rack (mm)	550 W x 650 D x 745 H	550 W x 650 D x 835 H	503 W x 432 D x 1448 H
Weight (kg)	300 (Main Body) 120 (Control Rack)	500 (Main Body) 120 (Control Rack)	1,300 (Main Body) 100 (Control Rack)

SiCentury Semiconductor Technology



PTW PRODUCT OFFERING

SUCCESS, SUCCESS!

SiCentury Semiconductor Technology (Suzhou) – founded in 2020 in Suzhou Industrial Park, Suzhou, China. SiCentury is a cutting-edge semiconductor manufacturing equipment provider with world-class talents and independent intellectual property rights.

With a global vision, SiCentury is committed to establishing the world's leading platform for key equipment and core technology in semiconductor industry. Our core management and technical experts boast decades of successful experience in R&D commercialization of high-end semiconductor manufacturing equipment.

SiCentury focuses on R&D, manufacturing, sales, and service of SiC/GaN and other compound semiconductor epitaxy equipment, providing global customers with world-class equipment and advanced technological solutions tailored for mass production and prospective research. Going forward, we plan to expand our portfolio to a wide range of semiconductor equipment.

SiCentury was the first manufacturer in China to realize volume sales of 6" and 8" silicon carbide epitaxy equipment with vertical airflow, which has continued to be used by more than a dozen top industry customers for mass production.

Integrated Silicon
Carbide Epitaxy
Equipment with
vertical airflow



◀ Split Silicon Carbide Epitaxy
Equipment with vertical airflow
Electrical and exhaust systems
can be placed independently

SiCentury Semiconductor Technology

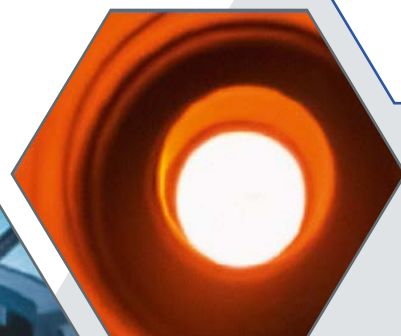


Features

- Throughput: $\geq 1,100$ wafers/month (dual chamber); can be optimized to 1,200 wafers/month through process optimization
- Epitaxy specification: 8"/6" compatible
- Temperature zones: multi-zone temperature control
- Airflow: vertical spraying shower head, airflow adjustable across multiple zones
- Rotation speed: 0-1,000 rpm
- Maximum epitaxial growth rate: $\geq 60 \mu\text{m}/\text{hour}$
- Thickness uniformity: $\leq 2\%$ (can be optimized to within 1 %, $\sigma/\text{average}$, EE 5MM)
- Doping uniformity: $\leq 3\%$ (can be optimized to within 1.5 %, $\sigma/\text{average}$, EE 5MM)
- Killer defect density: $\leq 0.2 \text{ cm}^{-2}$ (can be optimized to 0.01 cm^{-2})
- Unique advantage: better growth of high-voltage thickness films and trench-refilling epitaxy

Highlights

- High production efficiency: rapid heat-up/cool-down & tray pickup at high temperature, boosting throughput
- Fewer defects: perfect combination of vertical airflow and high-speed rotation, dramatically improving yield
- Low operating cost: cost-effective with long lifecycle consumables, reducing the cost per wafer
- Precise temperature control: accurate multiple-area vertical and horizontal temperature adjustment of the chambers and substrates
- Automation: automated wafer loading and transfer and tray switching system
- Continuous production: original adjustable chamber purging technology extending the PM interval
- Ease of maintenance: one-key automatic chamber opening/closing technology for quick and easy maintenance
- Customization: R&D and customization of products according to customer needs



Temperature
control

Air flow

CHAINSEM

CHAINSEM

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AMAT Semvision Support



Product Range

- SEMVision CX200, CX300, G2, G2FIB, G3, G3FIB, G4, G5



- Engineering service contract
- Flexible labor support
- SEMVision inspection, installation, maintenance and refurbishment



- Equipment relocation
- SEMVision spare parts sales
- Technical training





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