

BACO-SOLUTION

Company & production overview

Mar. 03th. 2022

- ❖ **About BACO-Solution**
- ❖ **Sales & capital flow**
- ❖ **RND & Engineering**
- ❖ **Product overview**
- ❖ **Business field**

About BACO-SOLUTION

Date of incorporation : 2013. 08. 19.
Field of Business : SEMI conductor sputter system
 DLC/TiCN sputter system
 Multi-coating sputter system
 Magnetron cathode
Head office Address : 613~615ho, 63-12,
 Dongtancheomdansaneop 1-ro,
 Hwaseong-si, Gyeonggi-do,
 Republic of Korea
TEL. : +82-31-613-8089
FAX : +82-31-613-0644
E-mail : sales@baco-solution.com
Homepage : http://www.baco-solution.com



BACO 2nd
Factory

Head Office

China Agent

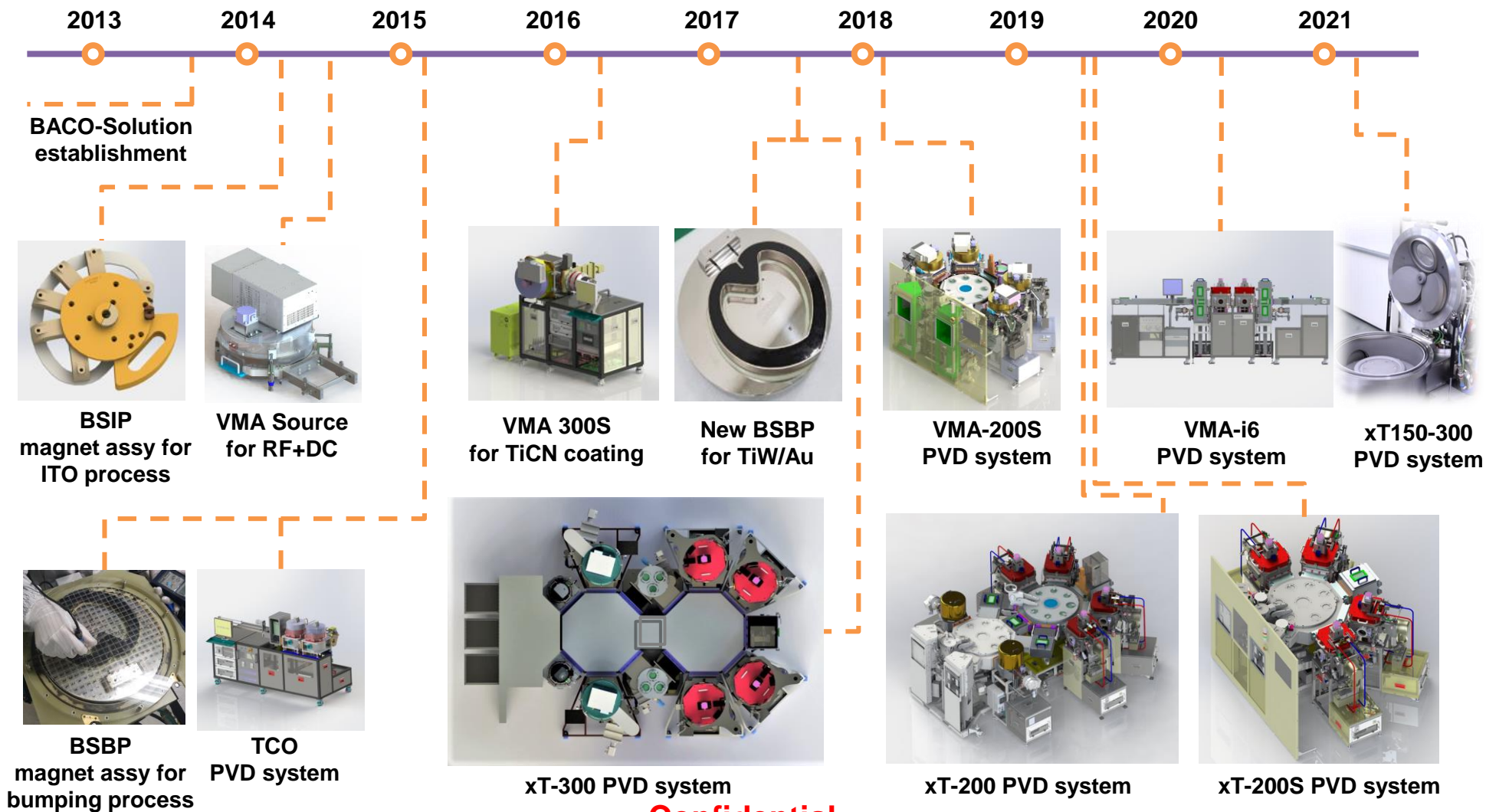
Taiwan Agent

Total 20 wafer PVD systems on mass production line

xT-300	3 system : NEPES 2, LB S***** 1
xT-200	6 system : NEPES 6, LB S***** 1
xT-200S	3 system : LB L**** 1, T** 1, HA** W** 1
VMA-i6	2 system : S***** , H*****
xT150-300	1 system : K***** 1
VMA300S	3 system : FR**** 2, FN* 1
TCO PVD	2 system : B*****1, S***** 1

History of launching products

Product release



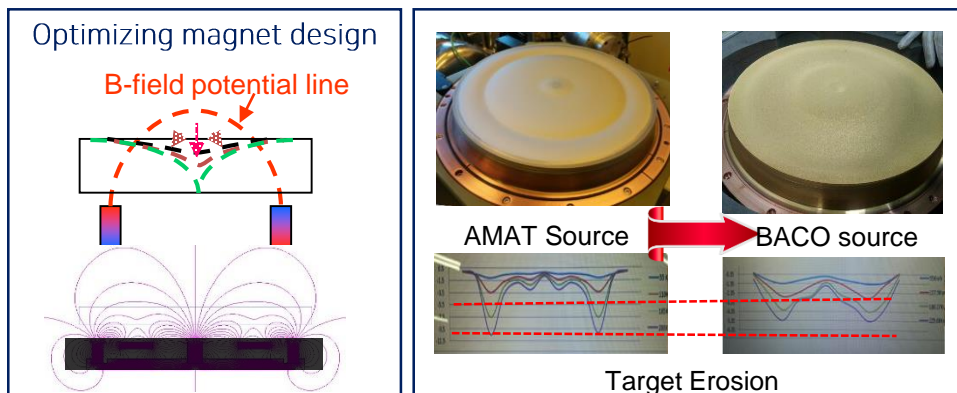
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RND & Engineering

PVD source

● PVD Source for UBM/Fan-out PVD system

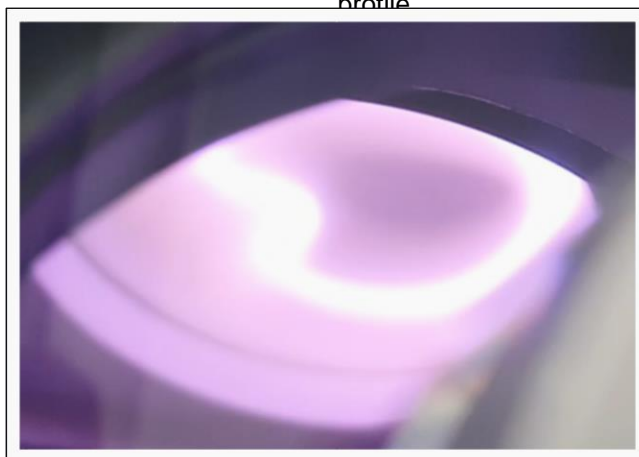
- Optimized magnet source for UBM, RDL
- Increased target utilization than conventional magnet source design.
- Saving target material cost, especially Au target.



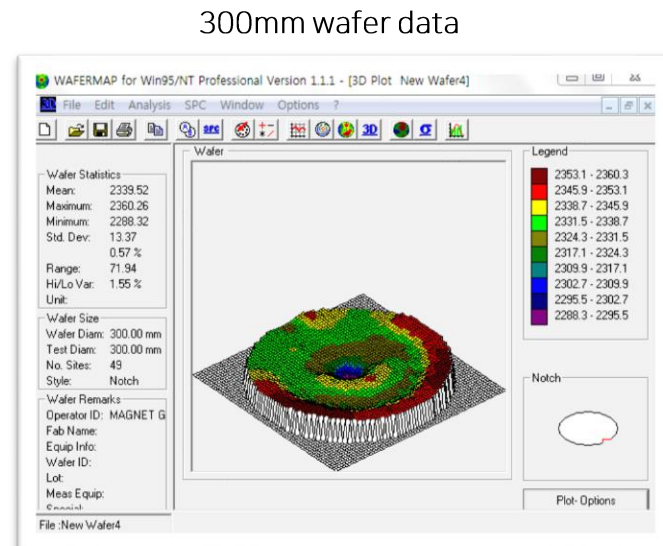
General magnet



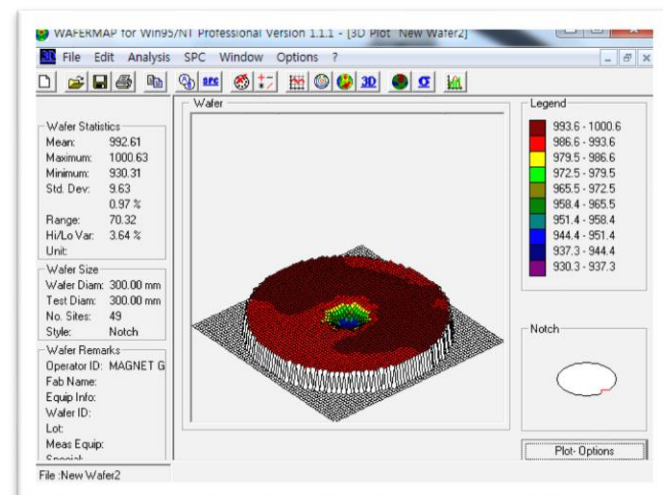
UBM Optimized magnet



Plasma ignition



TiW uniformity 1.55% @ 2300Å / 87Sec

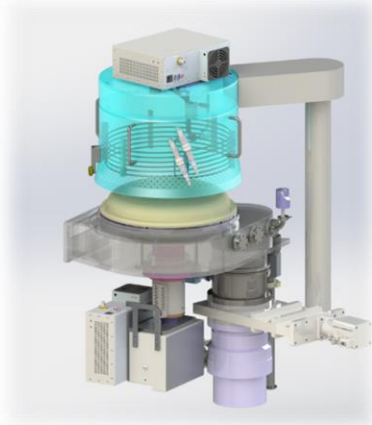


Au uniformity 3.64% @ 950Å/ 17Sec

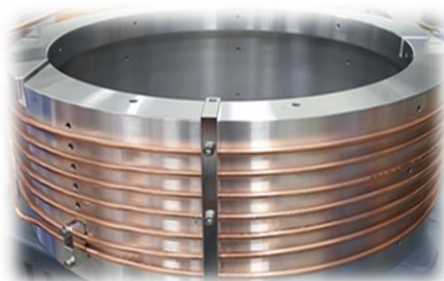
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Pre-clean source

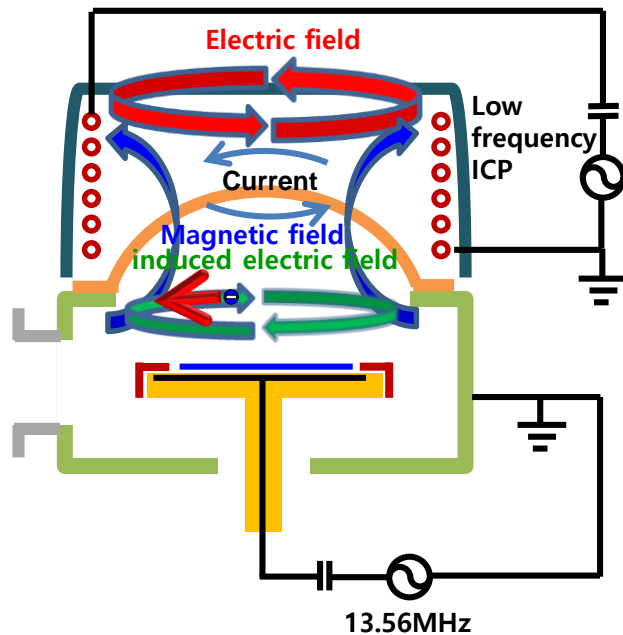
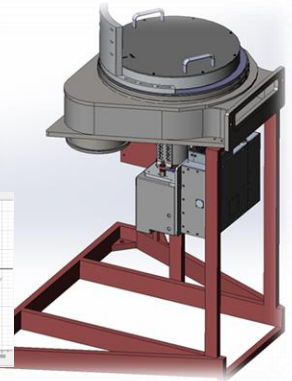
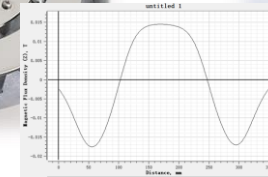
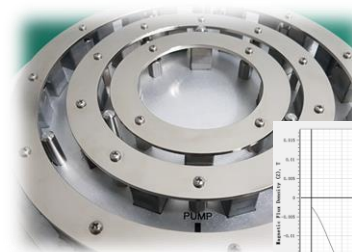
- Pre-clean Source development



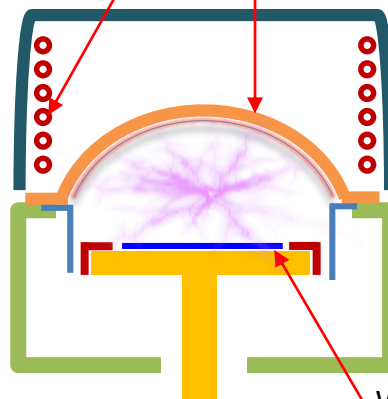
ICP Antenna



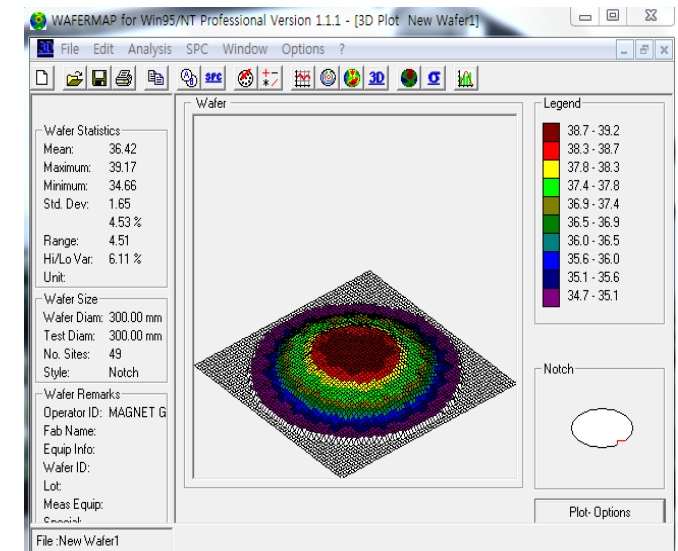
Magnet RF source



Bell jar (Quartz)
ICP antenna



Schematic of Pre-clean chamber

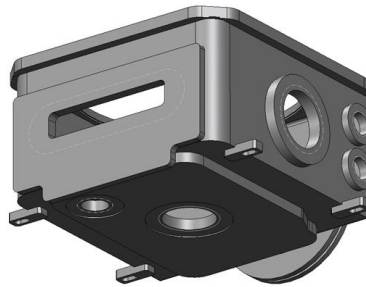
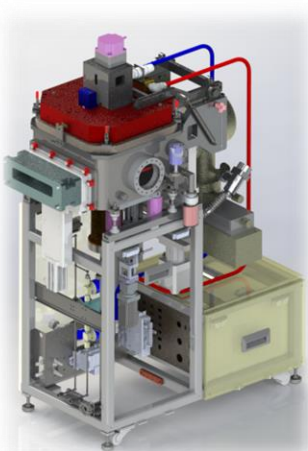


300mm Etch uniformity 6.11% @ 350Å / 68Sec

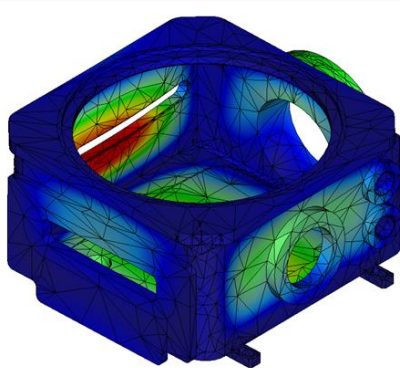
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● Structure simulation

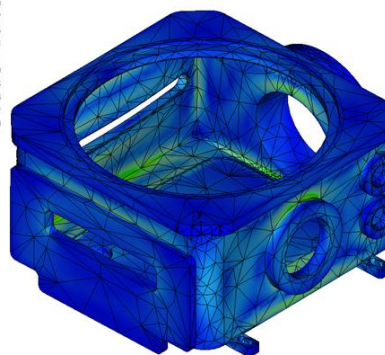
- Verification of structural stability through analysis.



Chamber design



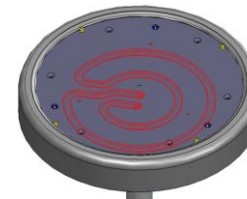
Deformation



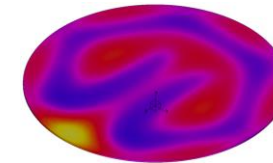
Stress

● Heat transfer simulation

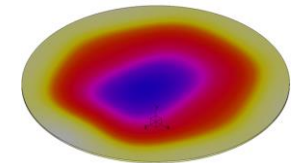
- Verification of Chuck and Wafer thermal transfer through analysis



Cooling chuck simulation



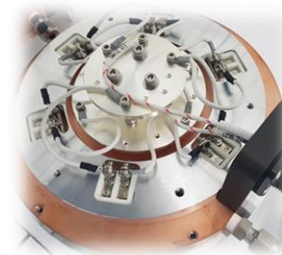
Chuck temp. profile



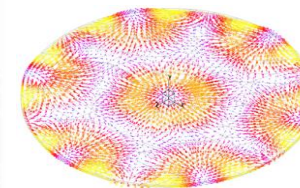
Wafer temp. profile

● Heat transfer simulation

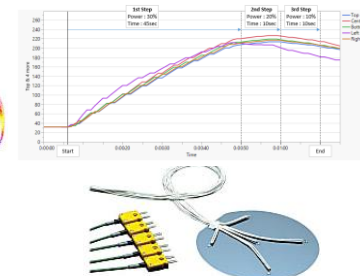
- Verification of degas heater through thermal analysis



Degas heater



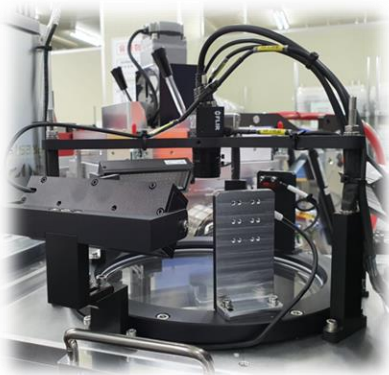
Wafer temp. profile



Test

- Customizing [Special function and solution]

- Wafer crack detection through vision system
- Multi stack degas chamber using heat gas



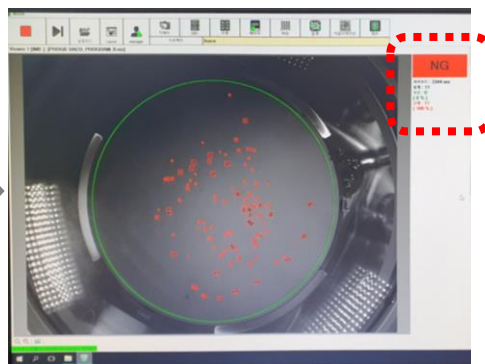
Wafer crack detection vision



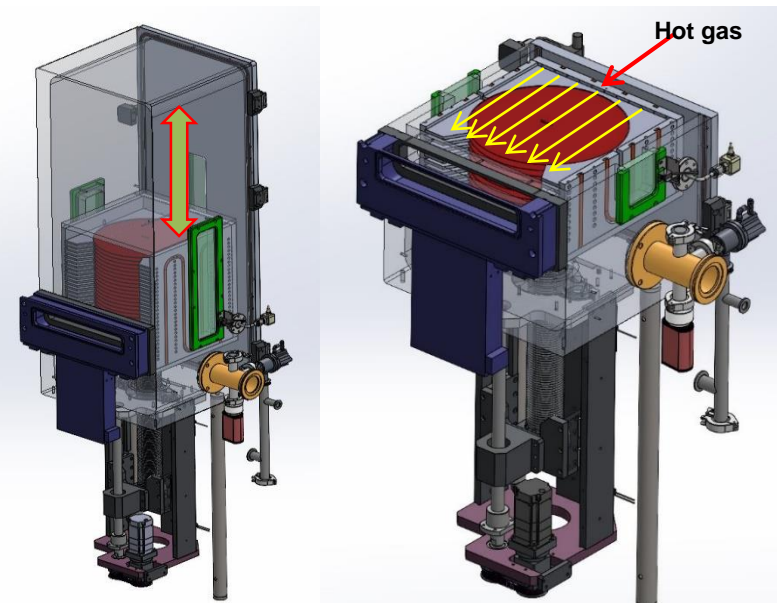
No crack detected



Wafer loading

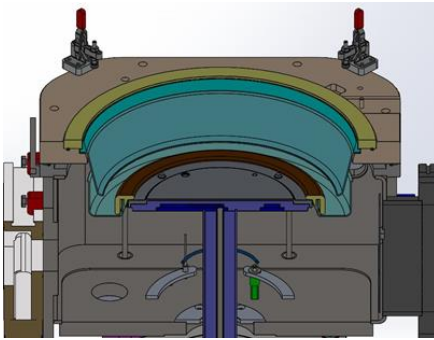


Crack detected

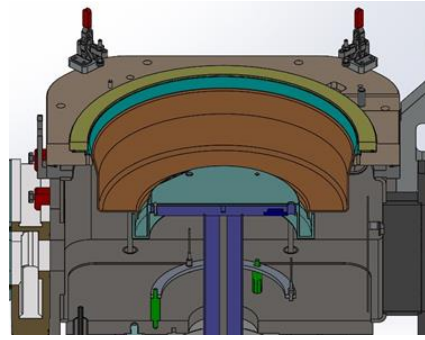


- Customizing [Special function and solution]

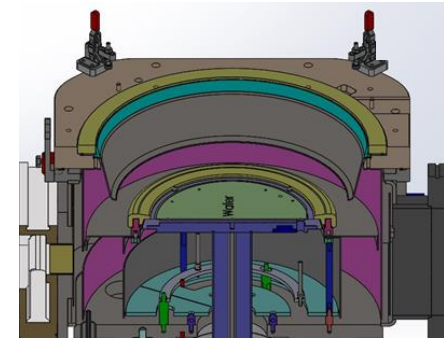
- Customizing chamber design for each customer's products



Standard PVD chamber
(AMAT, BACO)

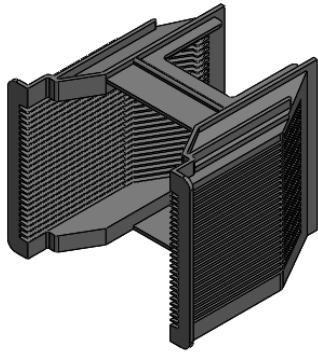


Customizing shield design

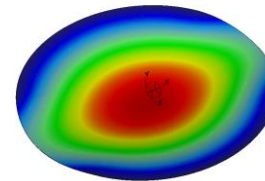
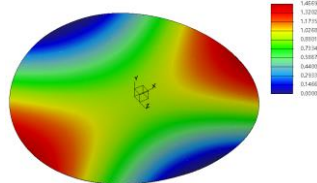


Special shield design for thin wafer
[Exhaust wafer temperature,
Chamber internal temperature ↓]

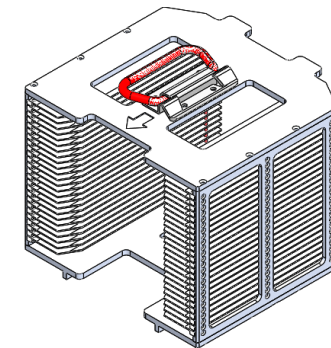
- Thin wafer handling



When using a standard cassette,
wafer sagging is more than 2mm



Special cassette design to reduce wafer sag to less than 0.3mm



Customer support

● Software development [Engineering support for customer]

- Own machine software Engine
- Own WPH simulation program can provide the proper configuration for each customers products (150mm, 200mm, 300mm)

The image displays four screenshots of the BACO Solution software interface, which is used for WPH (Wafer Per Hour) calculation and configuration.

Top Left Screenshot: Shows the 'Tact-Time Cal [300mm]' window. It includes a diagram of a wafer layout with various components labeled (PVD1, PVD2, PVD3, PVD4, TM1, TM2, CO1, CO2, PC1, PC2, LLA, LLB, WTR, Align, LPM1, LPM2, LPM3). Below the diagram are tables for 'Route #1 Result' and 'Route #2 Result'.

Top Right Screenshot: Shows the 'Configure Route' window. It includes a 'Save File Name' field, 'Save' and 'Open' buttons, and a 'Final Update' field. Below these are tables for 'Route #1' and 'Route #2' configurations, showing various parameters like #1, #2, #3, #4, #5, #6, #7, #8, #9, #10.

Bottom Left Screenshot: Shows the 'Form1' window. It includes a diagram of a wafer layout with components labeled (PVD1, PVD2, PVD3, PVD4, TM, WO1, WO2, LL, LLB, WTR, Align, LPM1, LPM2, LPM3). Below the diagram are tables for 'Route #1 Result' and 'Route #2 Result'.

Bottom Right Screenshot: Shows the 'Configure Route' window. It includes a 'Save File Name' field, 'Save' and 'Open' buttons, and a 'Final Update' field. Below these are tables for 'Common Config Time', 'LL Config Time', 'Cool Config Time', 'WO1 Config Time', 'WO2 Config Time', 'PM1 Config Time', 'PM2 Config Time', 'PM3 Config Time', and 'PM4 Config Time'.

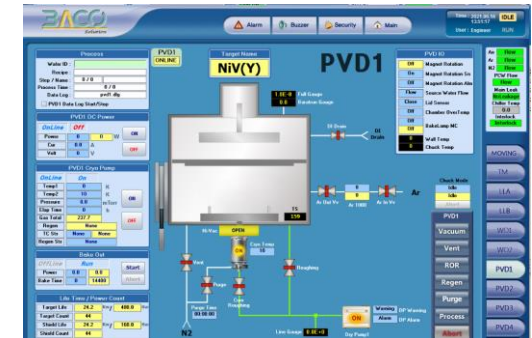
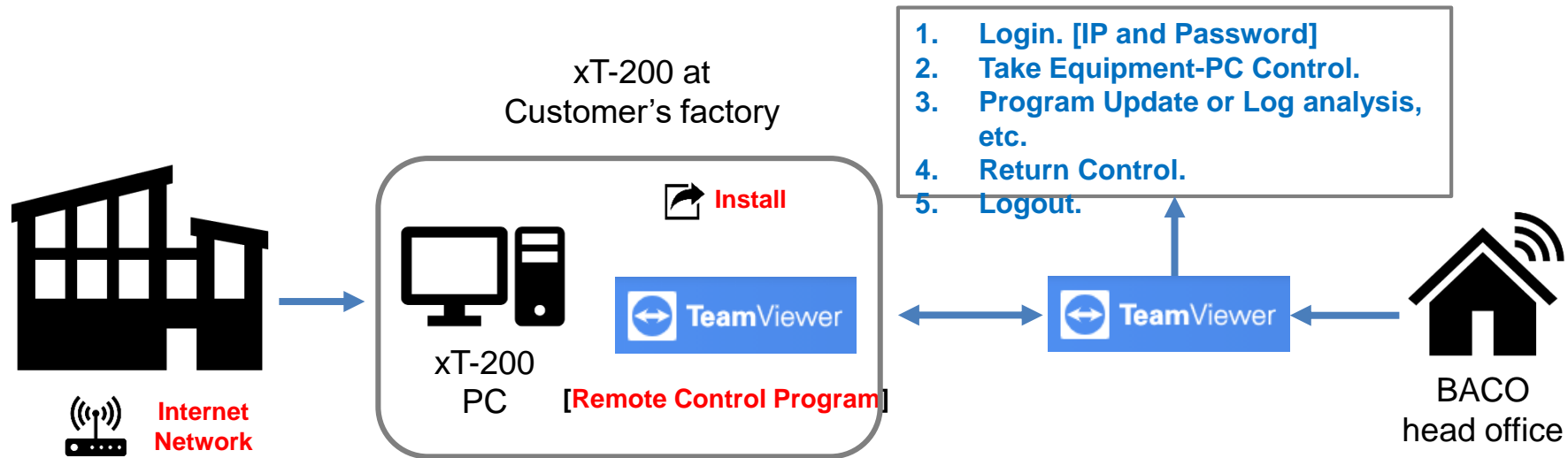
WPH calculation tools

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Remote control service

● Untact On-line support

- xT-200 can support the almost same as onsite customer.
- BACO engineers can support with TeamViewer outside of customer's factory.

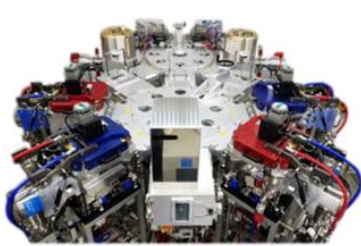


Products introduction

Products overview

- BACO xT PVD system

- RDL / UBM / TSV layer for WLP, FOWLP, DDI
- Probe card



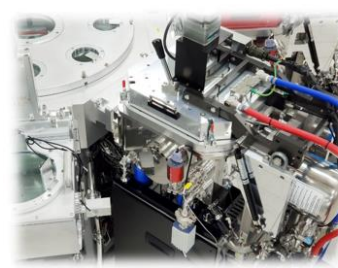
xT-200 for 200mm
PVD system



xT-300 for 300mm
PVD system

- BACO VMA PVD system

- DC / RF / DC+RF / Pulsed DC PVD system
- Metal, TCO, Oxide thin film



Metal-Oxide PVD system



Power Semiconductor PVD system

- Special purpose PVD system

- Co-deposition multi-layer PVD system (MOSFET...)
- DLC/TiCN high hardness PVD system (MCA chuck...)



Co-deposition multi-layer



DLC/TiCN high hardness coating system

- Component business

- PVD magnet development
- Cryo-pump overhaul



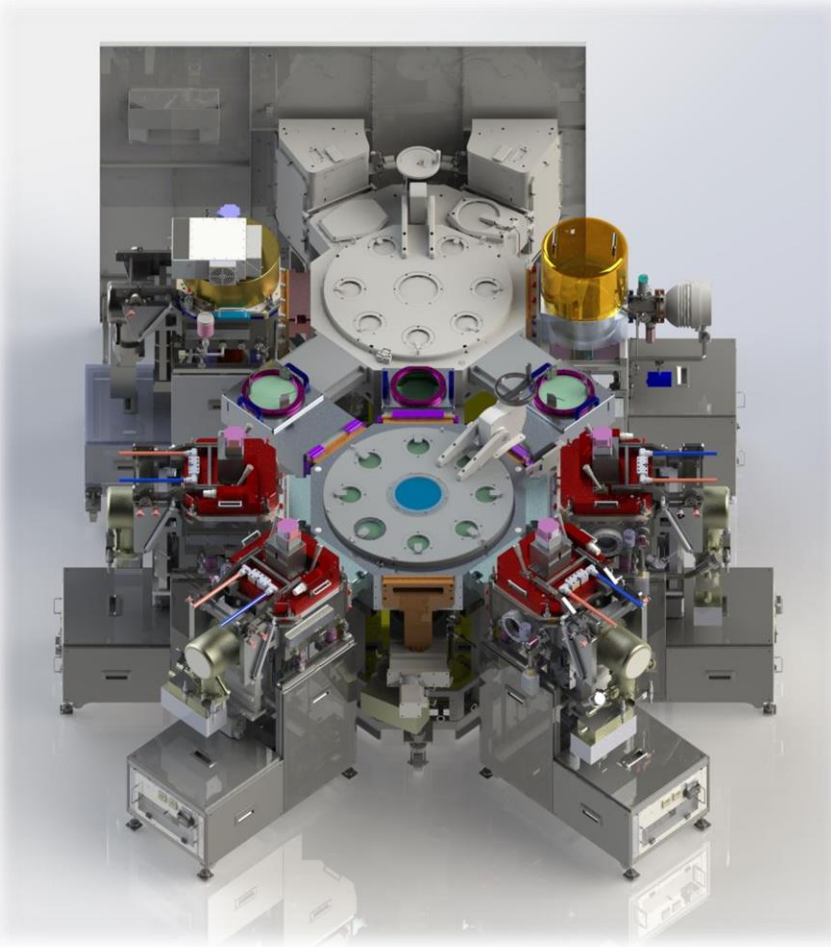
* VMA : Variable Material Application

* MCA chuck : Minimum Contact Area E-Chuck

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BACO xT PVD system

- BACO xT-200S, xT-200, xT-300



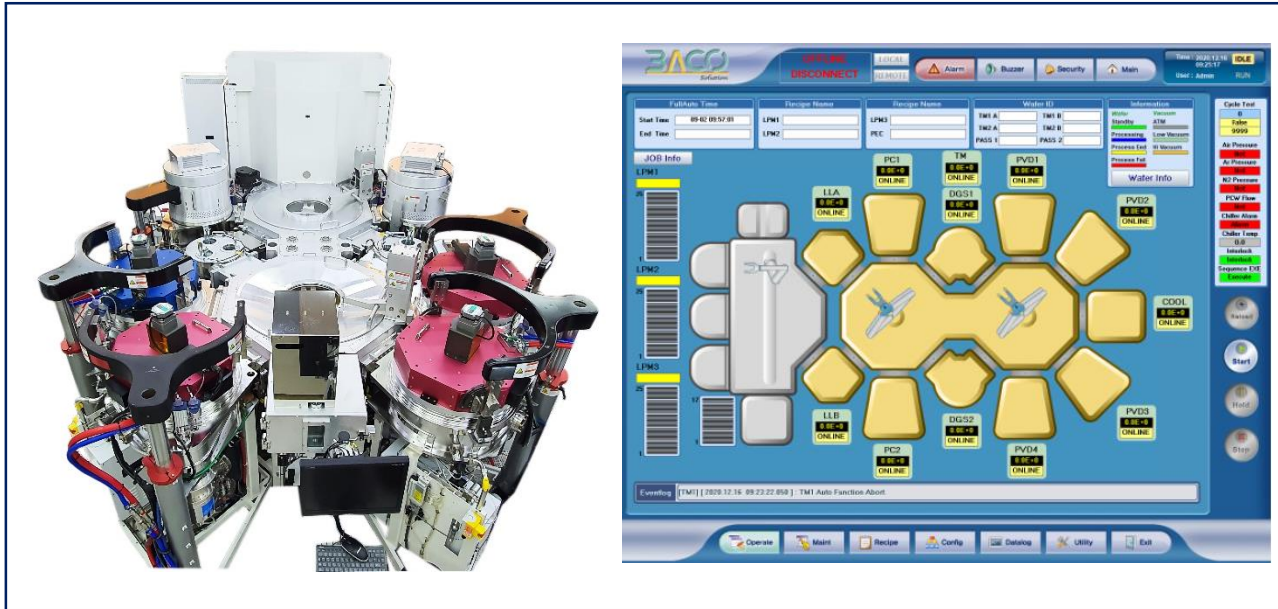
BACO's UBM PVD system is used for the latest semiconductor packaging, WLP, FOWLP, DDI, and RDL.

BACO xT PVD system, made for semiconductor packaging PVD process, is already been proven in mass production for semiconductors with high yield and quality.

- ✓ The first mass-produced PVD system that replaced AMAT
- ✓ Equipment verified in UBM mass production
- ✓ Own software engine proven in mass production
- ✓ Magnet source technology for various materials
- ✓ World-class thin film uniformity
- ✓ World-class target utilization
- ✓ World-class production

BACO xT PVD system

● 300mm 2-Cluster PVD system (BACO xT-300)



- EFEM 3Ports
- ATM Robot
- Load lock Chamber : 2ea
- Pre-Clean Chamber : 2ea
- Degas Chamber : 1~2ea
- Process Chamber : 4ea
- Cool Down Chamber : 1~2ea
- Transfer Chamber : 2ea
- Process Material : Metal, TCO, Oxide
- Wafer Size : 8Inch ~12Inch
- Uniformity : $\leq 3\%$

● BACO xT-300

- Many global foundry and Samsung foundry select xT-300 to replace AMAT equipment for 300mm.
- Excellence in production and quality compared to competitors.

BACO xT PVD system

● 200mm 2-cluster PVD system (BACO xT-200)



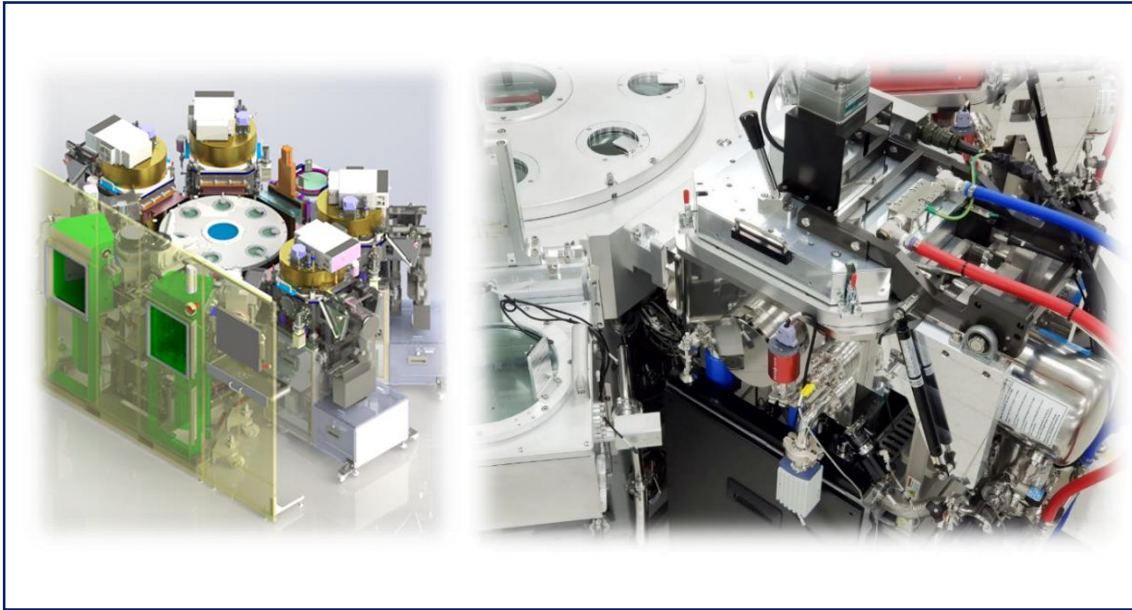
- Load lock Chamber : 2ea
- Pre-Clean Chamber : 2ea
- W/O & Degas Chamber : 2ea
- Process Chamber : 4ea
- Cool Down Chamber : 2ea
- Transfer Chamber : 2ea
- Process Material : Metal, TCO, Oxide
- Wafer Size: 2Inch ~8Inch
- Uniformity : $\leq 3\%$

● BACO xT-200

- Many global foundry and Samsung foundry select xT-300 to replace AMAT equipment for 300mm.
- Excellence in production and quality compared to competitors.

BACO VMA PVD system

● Metal-Oxide, TCO PVD system



- Power : DC/RF / RF+DC / Pulsed DC
- Vacuum : ATM~5x10⁻⁸Torr
- Pump Type : Cryo Pump & TMP Pump
- Heater Temp : 25°C~700°C
- Target Material : Metal / TCO / Oxide
- Plasma Damage free
- Wafer Size: 2inch ~12inch
- Uniformity : ≤3%

● VMA PVD System

- Selectable configurations for DC, RF, and RF+DC mode without any machine modification.
- Metal, TCO, Oxide film deposition.
- Low plasma damage process.
- Various source magnets for process conversion.
- Customizing PVD source development for customer's new products.
- Glass wafer available

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* VMA : Variable Material Application

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BACO VMA PVD system

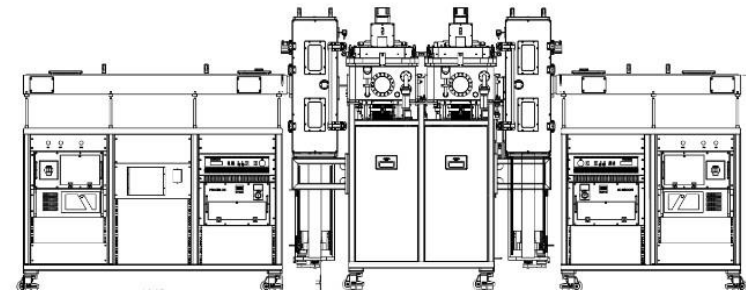
● Multi-power PVD System for power semiconductor (VMA-i6)



- DC + RF multi power
- Two PVD chambers
- New designed BSBP magnet
- 12.9" Source Kit
- Bake-out lamp
- Metal heating (Up to 250°C)
- Loading/Unloading units
- Two Load Locks

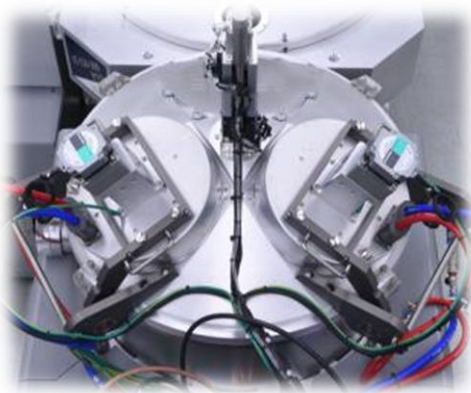
● VMA i6

- Low COST VMA PVD system
- Metal, TCO, Oxide film deposition.
- Low plasma damage process.
- Various source magnets for process conversion.
- Customizing PVD source development for customer's new products.
- Glass wafer available



Special purpose PVD system

● Co-deposition multi-layer PVD system



- Load lock Chamber : 1ea
- Pre-Clean Chamber : 1ea
- Process Chamber for 6" : 1ea
- Process Chamber for 12" : 1ea
- Transfer Chamber : 1ea
- Process Material : Metal, TCO, Oxide
- Wafer Size: 6~12Inch
- Uniformity : $\leq 2\%$

● BACO xT150-300

- Processing of 6", 8", and 12" wafers in one system.
- High-temperature multi-layer sputtering system using RF+DC power.

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Special purpose PVD system

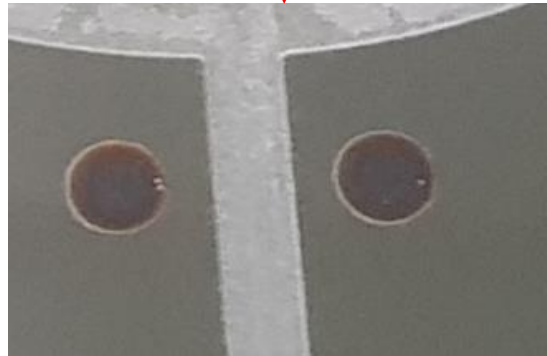
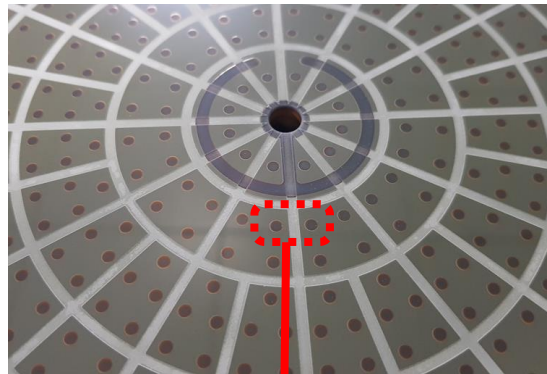
● DLC/TiCN high hardness PVD system



MCA chuck coating system

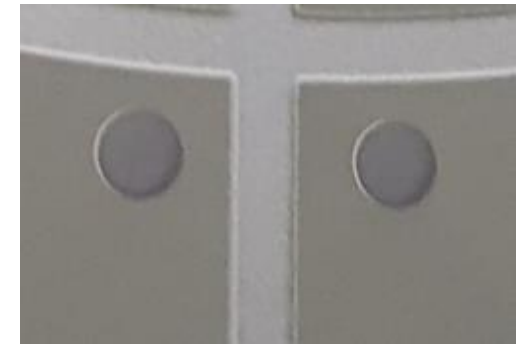
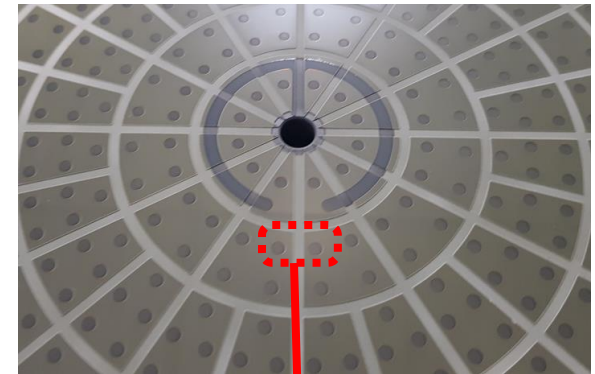
- Power : RF, DC, Pulse DC, LF
- Vacuum : ATM~5x10⁻⁸Torr
- Pump Type : Cryo Pump & TMP Pump
- Heater Temp : -10°C~700°C
- Target Material : Metal, TCO, Oxide
- Wafer Size: 2inch ~12inch
- Uniformity : ≤3%

Competitors PVD system



Coating quality ↓

BACO VMA 300s PVD



Excellent coating uniformity

Component business

● Magnet development

- Various characteristics required by customers.
- More than 200 sales for semiconductor production.



Metal magnet - AL, Ag, Au, Cr, Ni, Ti, W, TiN, TiW, TiCN
Oxide magnet - SiO₂, SiN_x, Mox, ZTO, AL₂O₃, DLC
TCO Magnet - ITO, GZO, GAZO, AZO

Magnet Gauss Improvement
Plasma Density Control
Plasma Temp Improvement

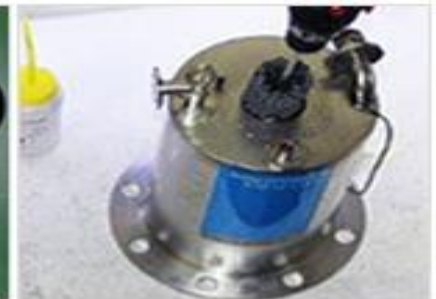
● Cryo pump overhaul

- Repair and overhaul cryopumps and compressors.
- 80 units of monthly repairable quantity.

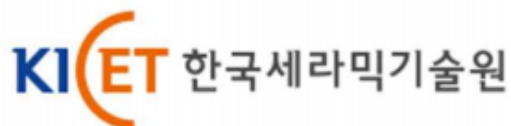
• FACTORY-IN
• INSPECTION
• DISASSEMBLE

• PARTS CLEANING
• BAKE OUT
• CRITICAL PARTS CHANGE

• LEAK TEST
• PUMPING DOWN TEST
• Ar FLOW TEST



Business partner





Thank you !