



Introduction of BEST C.O.O. Equipment From Japan

LOCATION

Established 1999

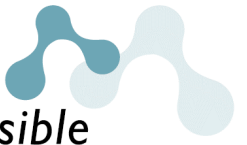


SAITAMA Prefecture
(Approx. 30 km from Tokyo)

2nd Factory
in OKINAWA



PRODUCTS

ASAP 
as soon as possible



Coater



Mask Aligner



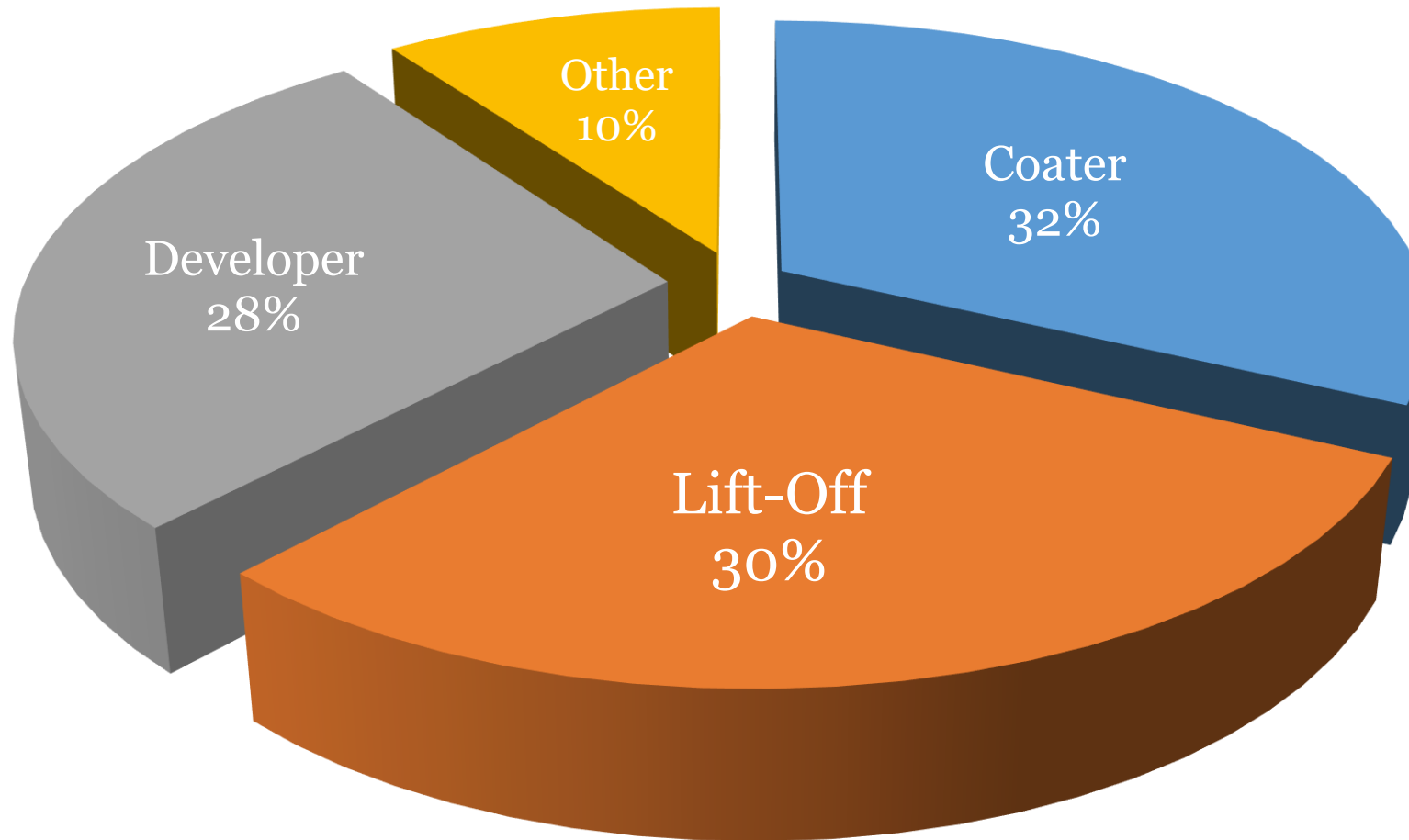
Developer



Lift-Off

Only Company in Japan with this Product Suite Offering

Products Shipped (up January 2020)



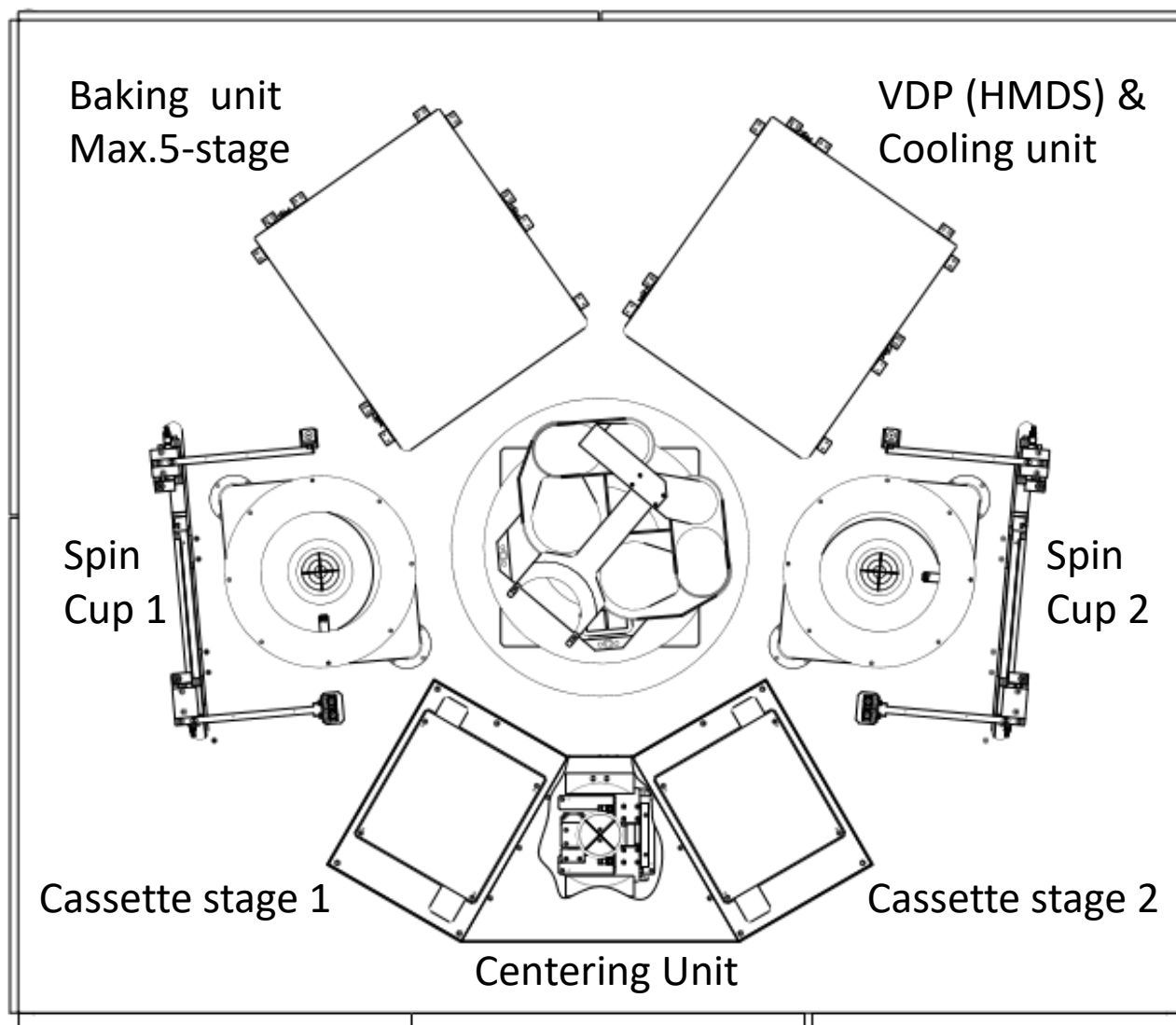
250+ Sets

Basic Enclosure of:

Stand alone Spin Coater
Stand alone Spin Developer
Combo Coater & Developer
Metal Liftoff System
Wafer Scrubber / Cleaner
Mask Aligner

Spin Coater & (Developer)

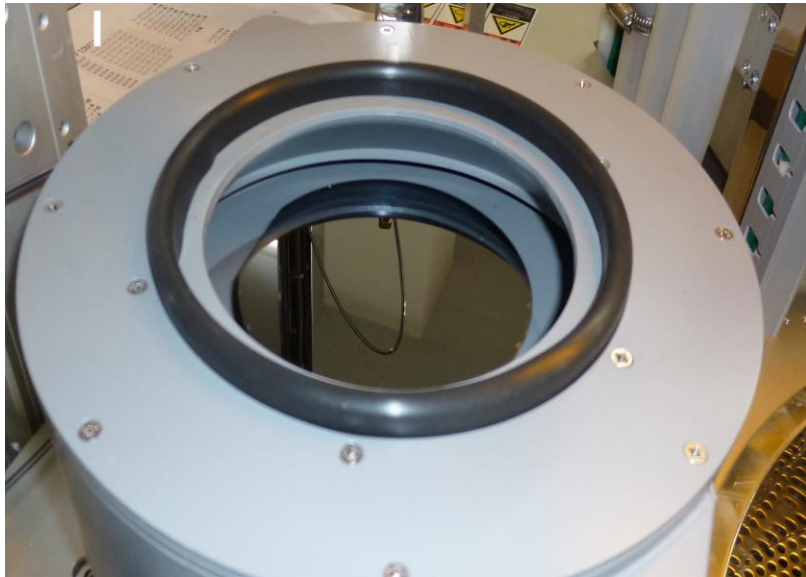
Typical System Configuration



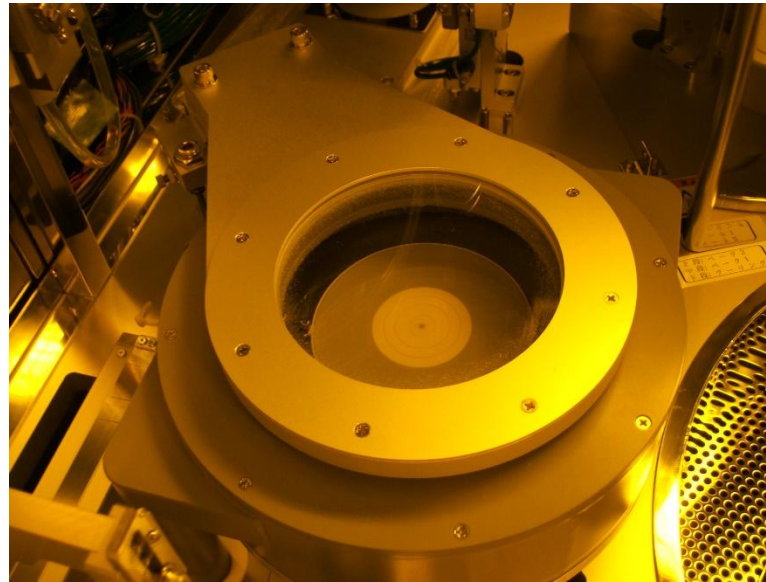
Process Cup Design of Coating system

Cup design differs from depending on viscosity, substrate shape and target thickness.

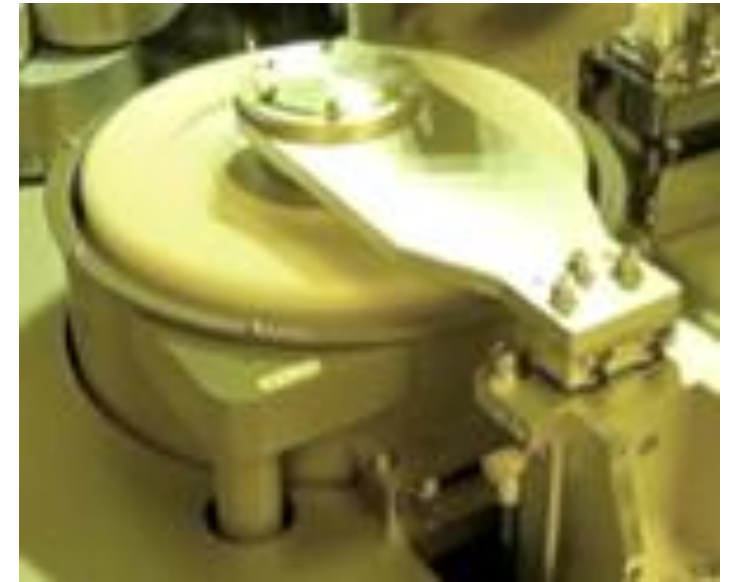
OPEN



CLOSE



ROTATION



For thin film coating or
Low Viscosity Photoresist,
mainly for **Positive PR**

For thick film coating or
High Viscosity Photoresist,
Mainly for **Negative PR**

For **Square substrate** or
Expecting good coverage,
Less material coating (eg) **PI**

Rotating-Cup Coating Method



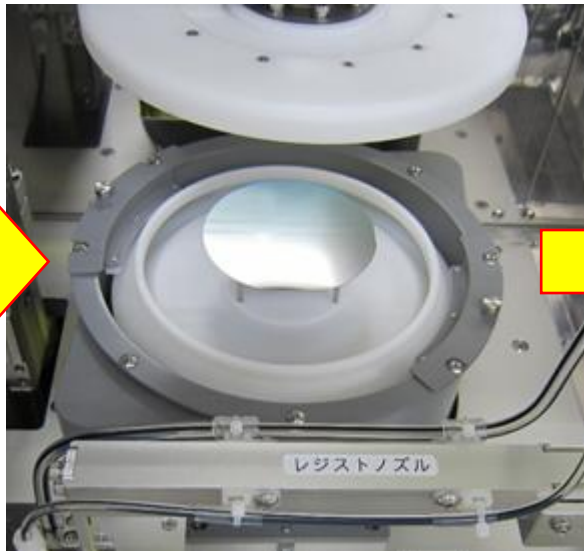
This design is good at coating of

- **Square Substrate**
- **High viscosity resist
(or Thick film coating)**
- **Less material usage
(or Expensive material)**

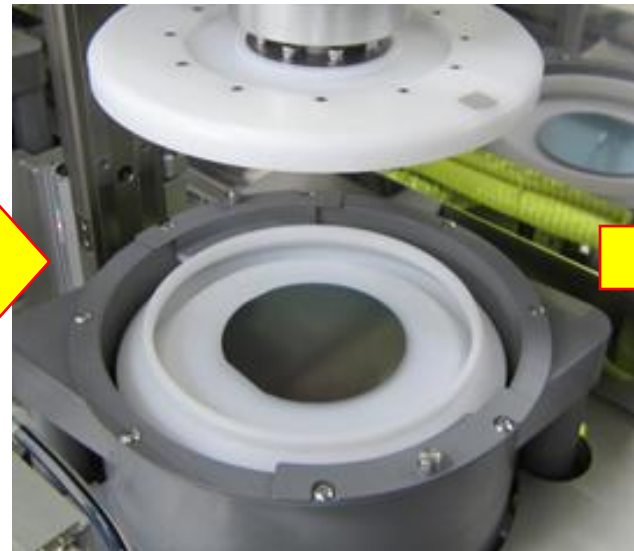
Rotating-Cup Coating Flow



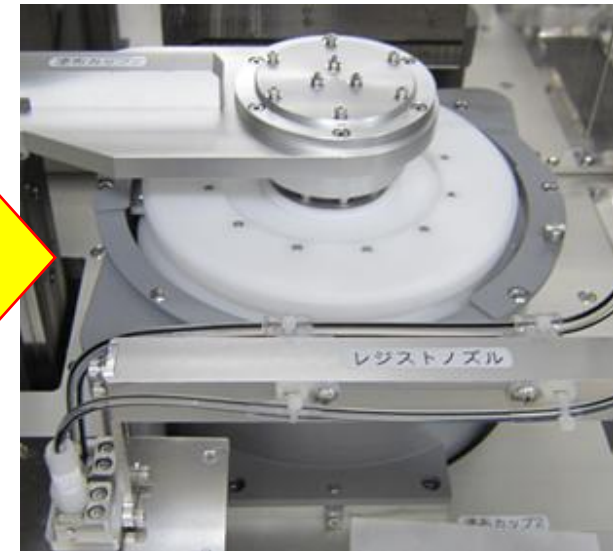
Ready



Place work



Work hold by vacuum
&
PR dispense



Close & Spin

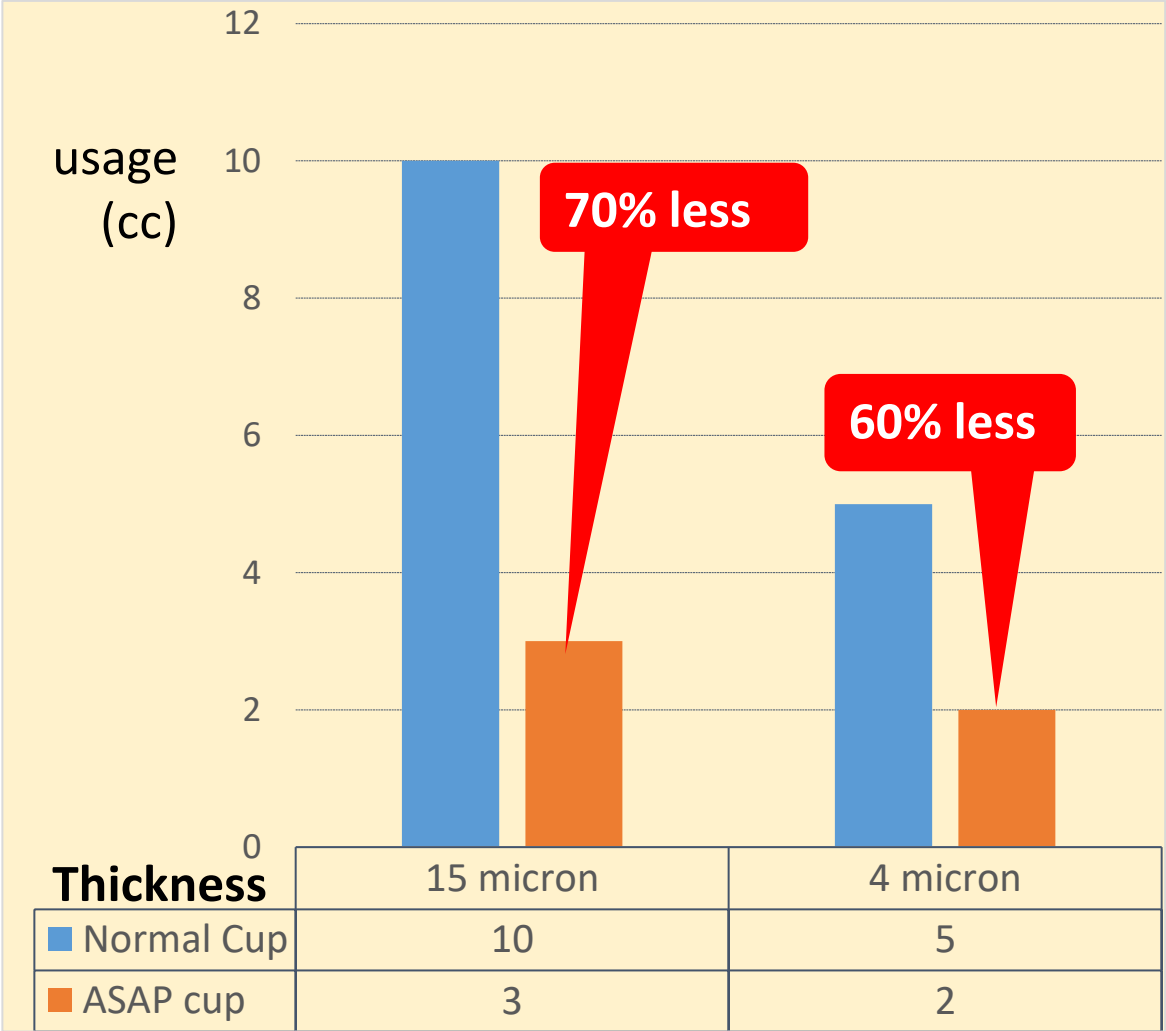
High viscosity coating data

Photo Resist	Tokyo Ohka	AZ electronics	TOK	JSR	HD microsystems
Model	TCIR	AZ-4620	PMER-LA900	THB	PIX-3400
Viscosity	96 cp	400 cp	900 cp	1,750 cp	13,000 cp
Wafer size	8 inch	8 inch	8 inch	8 inch	6 inch
Thickness	40,000Å	62,500Å	300,000Å	413,000Å	100,000Å
Uniformity (max-min)/ave	1.39 %	1.67 %	2.68 %	3.76 %	4.7 %
W to W uniformity	0.84 %	0.91 %	1.02 %	1.13 %	1.51%

Polyimide coating performance



(e.g.) **Polyimide** coating for $\Phi 150\text{mm}$ wafer



Auto Mask Aligner

Model: AMA6000



Background and overview

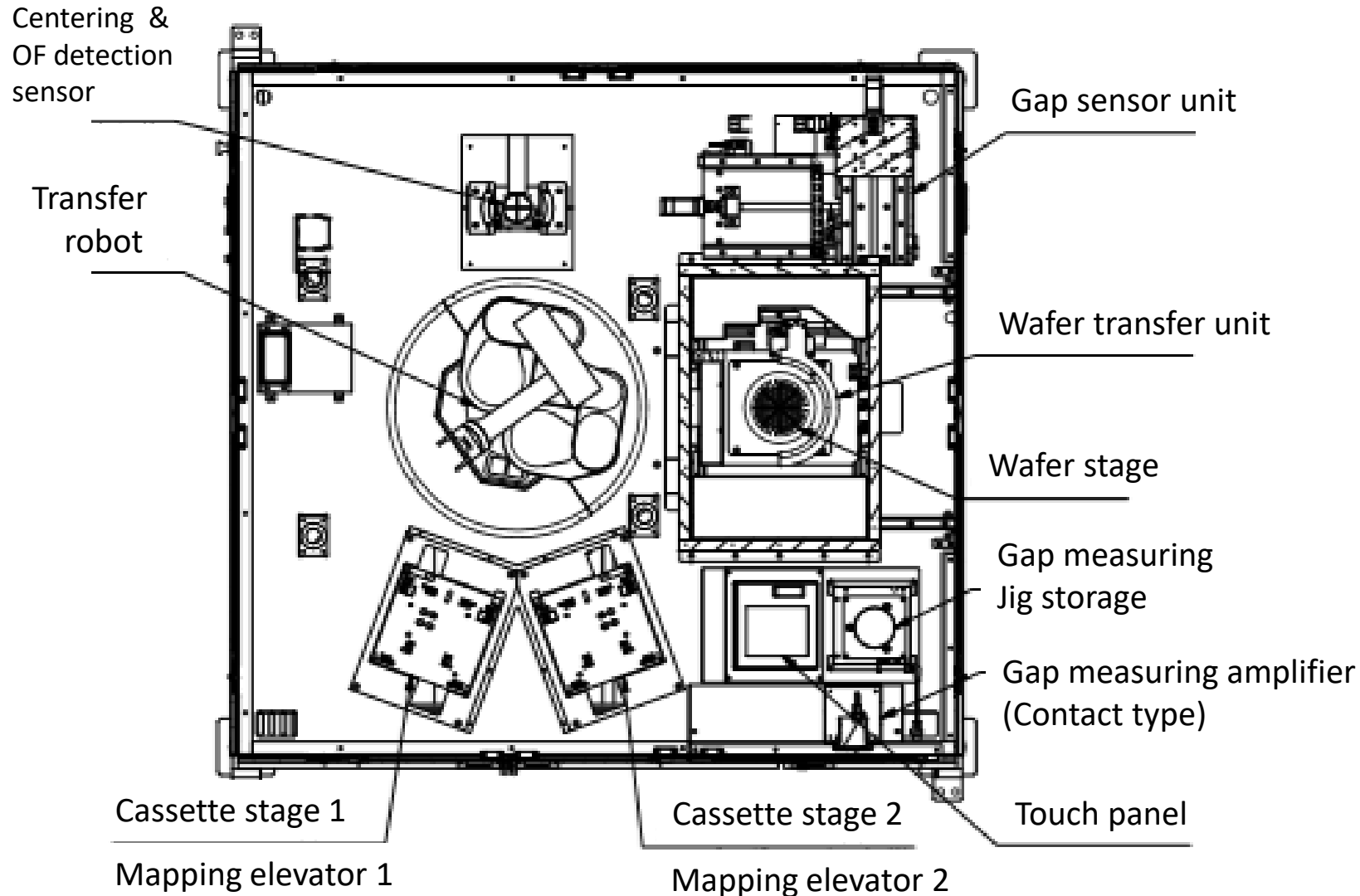
In the manufacture of integrated circuits such as LSIs, miniaturization has progressed, and an exposure apparatus with extremely high resolution has been required.

However, in the production of discrete (individual semiconductors), there are many products that can be manufactured sufficiently if they have a resolving power of several tens μm to several μm .

In the field of contact exposure apparatuses, at present, importance is placed on price and productivity over high resolution.

ASAP will provide an integrated photolithography line for coating, exposure, and development by adding an automatic mask aligner to the product lineup, and **will offer not only cost reduction but also a complete photolithography solution.**

System configuration & Dimension



Size : 1200 x 1260 x 2000 mm

Automatic parallelizing function & high precision gap management.

The conventional parallel adjustment mechanism is such that a gap ball is sandwiched between a mask and a wafer to fix a spherical bearing.

Although physical contact was required,

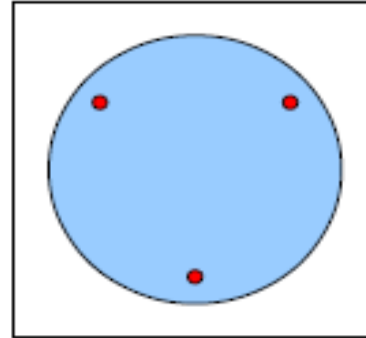
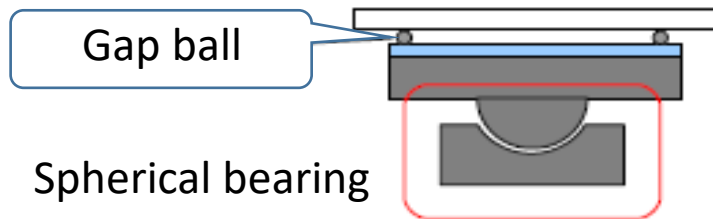
ASAP has a mechanism to adjust the parallelism completely without contact.

The parallelism between the mask and the wafer is automatically adjusted by driving the tilt axis while measuring the gap between the mask and the wafer using a laser displacement meter with a resolution of 0.1 μ m. The laser displacement meter is also used to control the gap during exposure, achieving high repeatability.

Completely non-contact **reduces yield loss** due to damage to the mask and wafer and **reduces mask disposal costs**.

Features of ASAP Mask Aligner

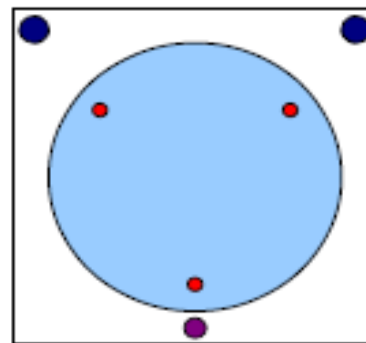
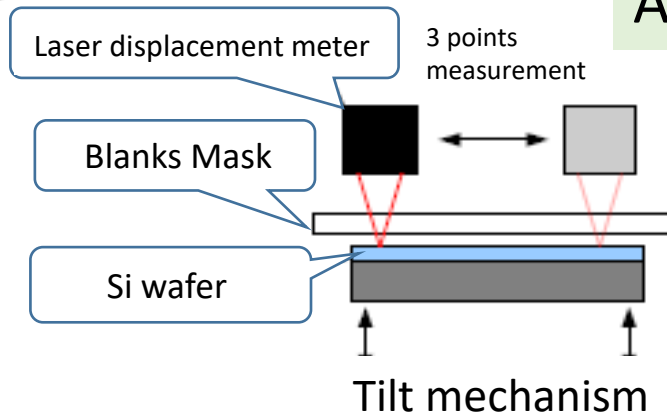
Conventional method



- Gap ball contact point

Gap ball makes a damage to the mask.

ASAP method

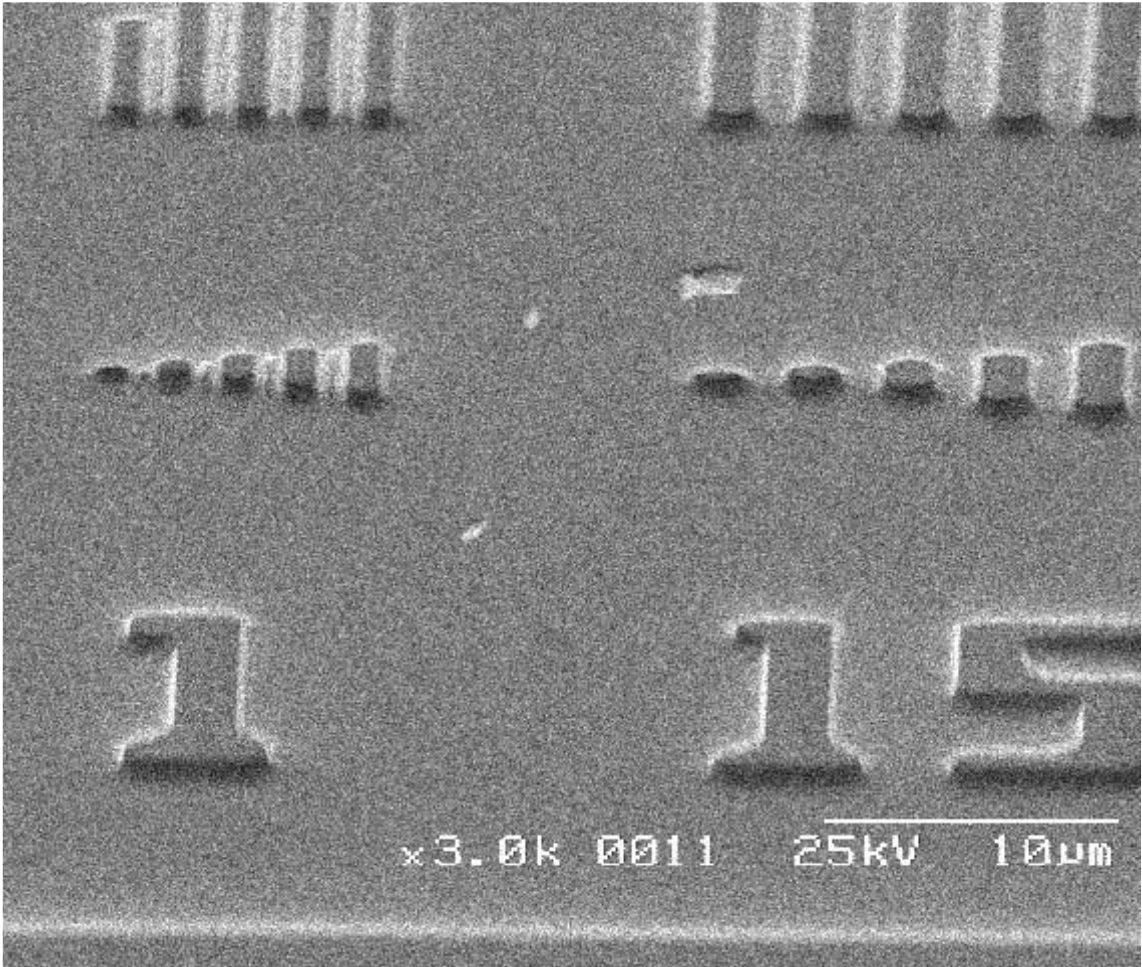


- Tilt drive shaft
- Tilt fixing shaft
- Gap measuring point

No damage to the wafer & mask is realized by non-contact.

Exposure Performance

【Conditions】		
Substrate	:	Si (OAP treatment)
Film Thickness	:	0.8um (OFPR-800LB)
Prebake	:	90°C / 90s
Development	:	NMD-3 (2.38%)
Rinse	:	DI water / 20s



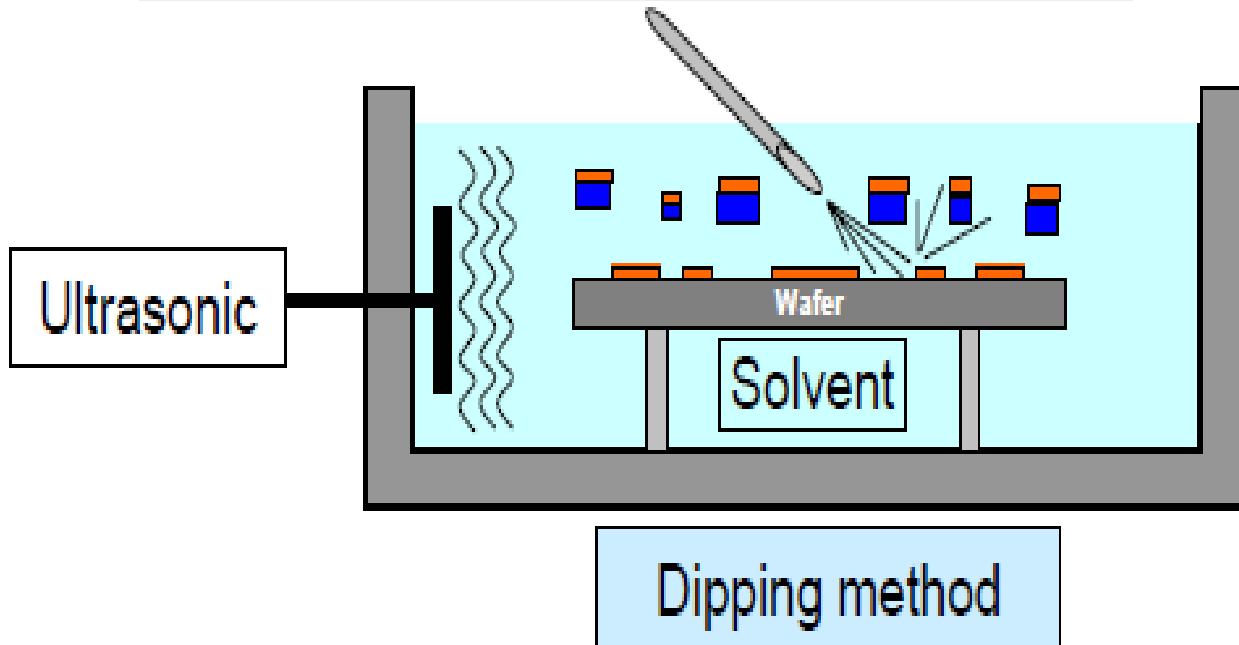
AMA6000 Specification

Main specifications	Mask Size	□3" ~ □7"
	Wafer Size	φ2" ~ φ6"
	Equipment Size	1200×1260×1900
	Conveyance method	Double arm clean robot (Class1 correspond)
Exposure unit	Exposure department specifications	Proximity exposure (Gap adjustment width 0μm - 999μm)
		Soft contact exposure
		Hard-contact
	Light source power	Ultrahigh pressure mercury lamp 250W (500W available)
	Irradiation diameter	φ165
	Illumination	13 (mW/cm ²)above
Alignment	Illumination uniform degree	±5%
	XY axis stroke	±5mm
	Z axis stroke	30mm
	θ axis stroke	±5deg
	TI axis stroke	X direction ±1deg
		Y direction ±1deg
Alignment method	Parallelism degree about between mask and wafer	(Within ±0.4μm) Our company set up the 4 inch 3piont
	Image recognition	Image recognition with the CCD camera. Alignment engine made by FAST.
	Alignment Stage movement	Auto or alignment in manual. make by HEPHAIST Company

Metal Lift-Off System

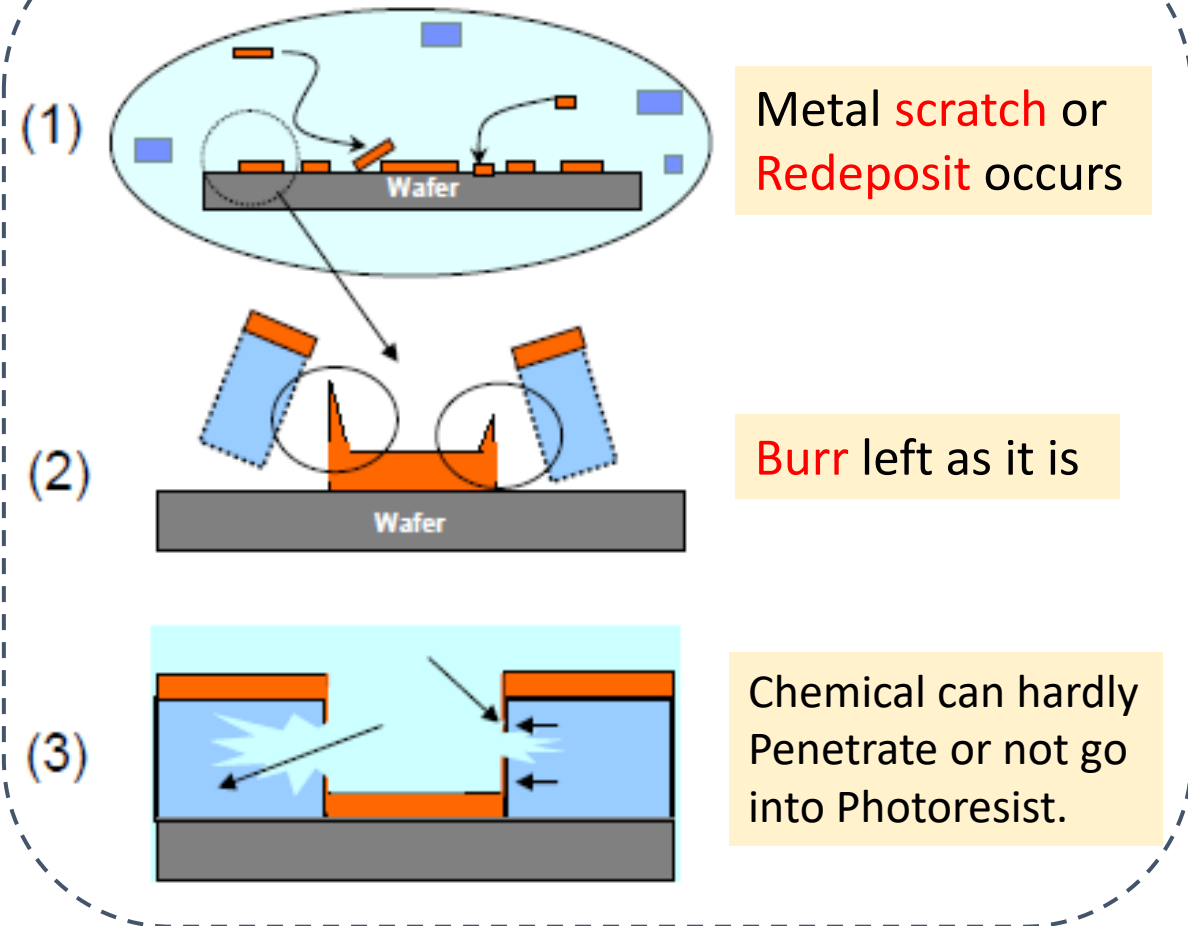
Process method comparison (1)

Dip + High pressure Method



There are 3 typical major issues at liftoff process such as **REDEPOSIT**, **SCRATCH**, and **BURR**.
ASAP's system is the only one solution to these issues.

Typical Problems



Process method comparison (2)

Liftoff process needs **chemical effect** to dissolve photo-resist, and **physical force** to remove metal from substrate.

Process method	Strong point	Weak point
Dip + High pressure	• High productivity • Easy to recycle chemical • Optimize the current Wet bench	• Metal redeposit issue • Big footprint per WPH • High initial cost
Tape + Dip	• Low initial cost • Less chemical consumption	• Burr issue • Need 2 step process (not exist integrated equipment) • Low metal recycle rate
Dip + Ultrasonic(or spray)	• Lowest initial cost • Less chemical consumption	• Burr issue • Metal redeposit issue • Low metal recycle rate
ASAP's high pressure system (Fully single wafer process)	• Highest productivity and repeatability • Lowest chemical consumption • No redeposit, No burr, Better yield	• Moderate to high initial cost • Easily recovered yield improvement and chemical cost

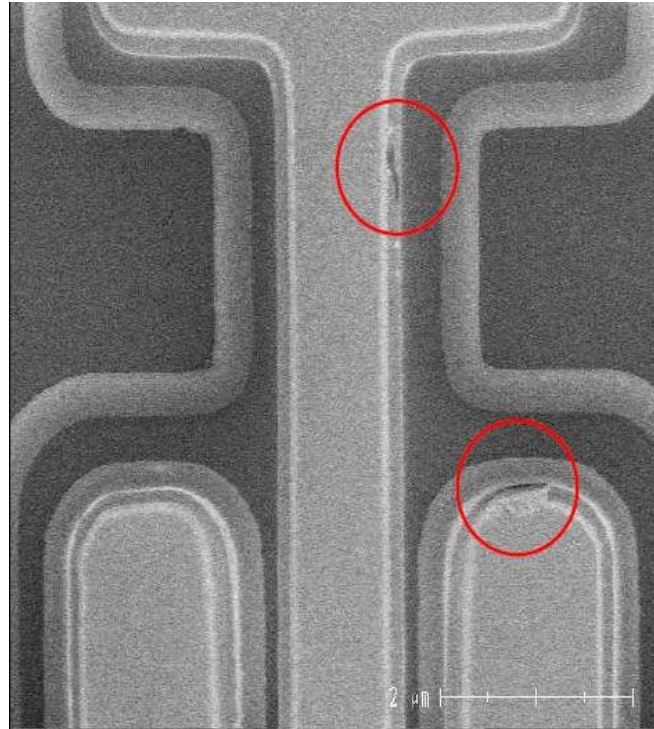
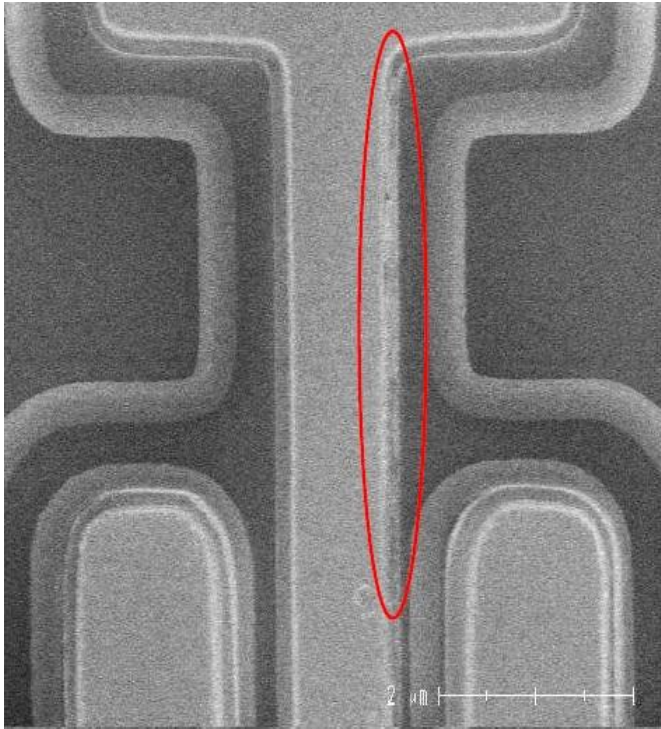
ASAP's high pressure system is much different from other supplier's.
Our system occurs very powerful **Micro-Cavitation (MC)**.

MC makes micro-bubble in liquid (solvent)
which has very strong detergency. It realizes
short time process, no burr, less chemical consumption, etc...

Process method comparison (3-1)

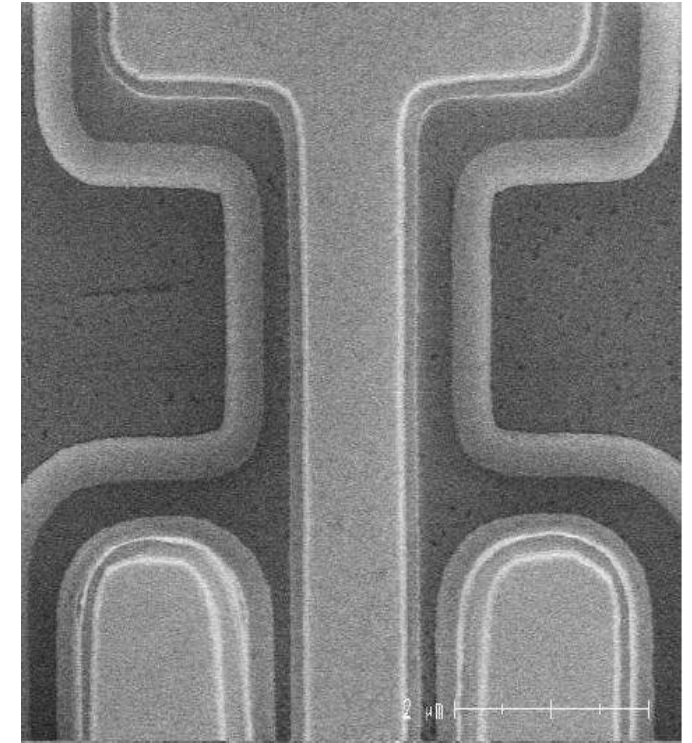
< Example of burr issue improvement >

Dip + High pressure



VS

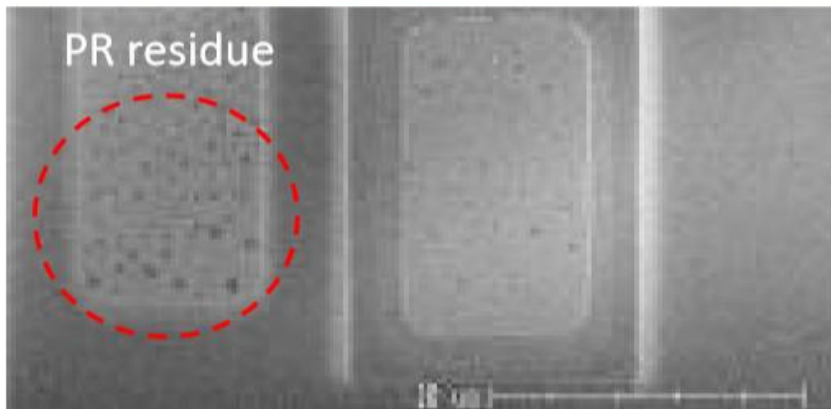
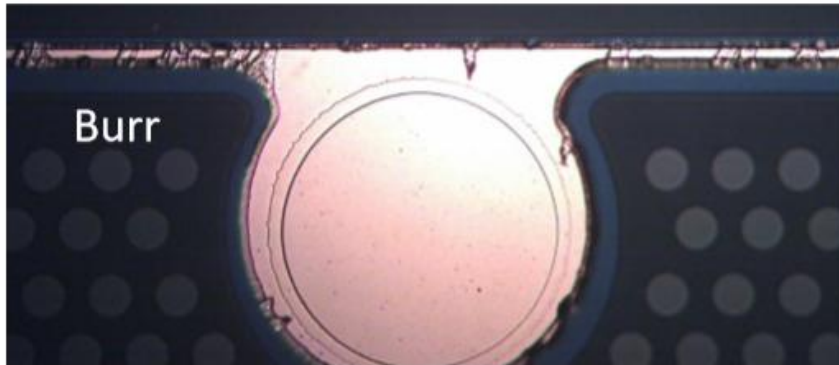
ASAP's High pressure



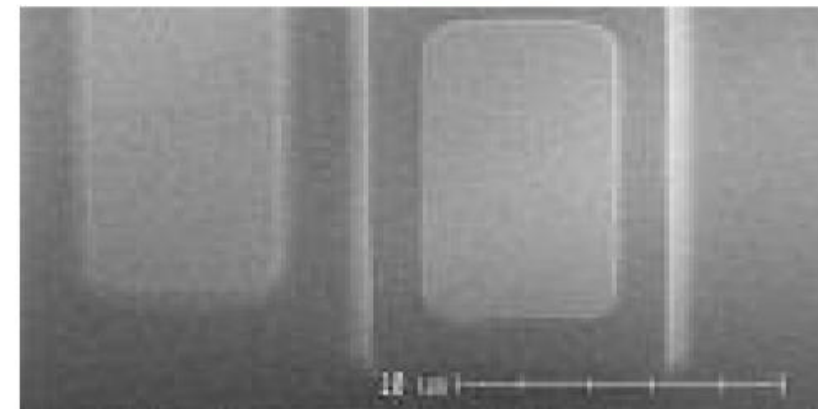
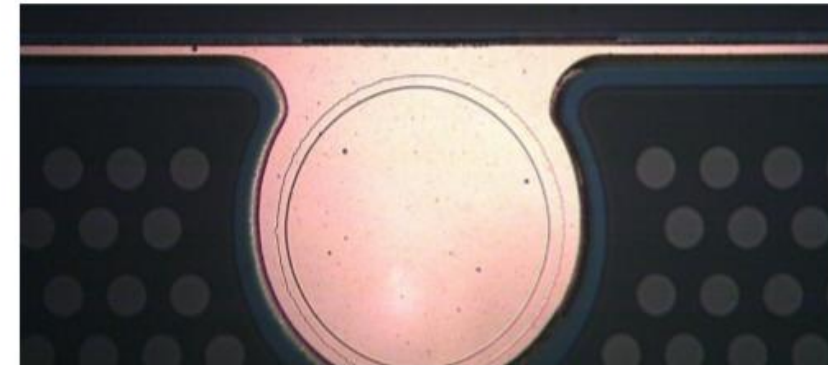
Process method comparison (3-1)

< Example of burr issue improvement >

Dip + High pressure



ASAP's High pressure



VS

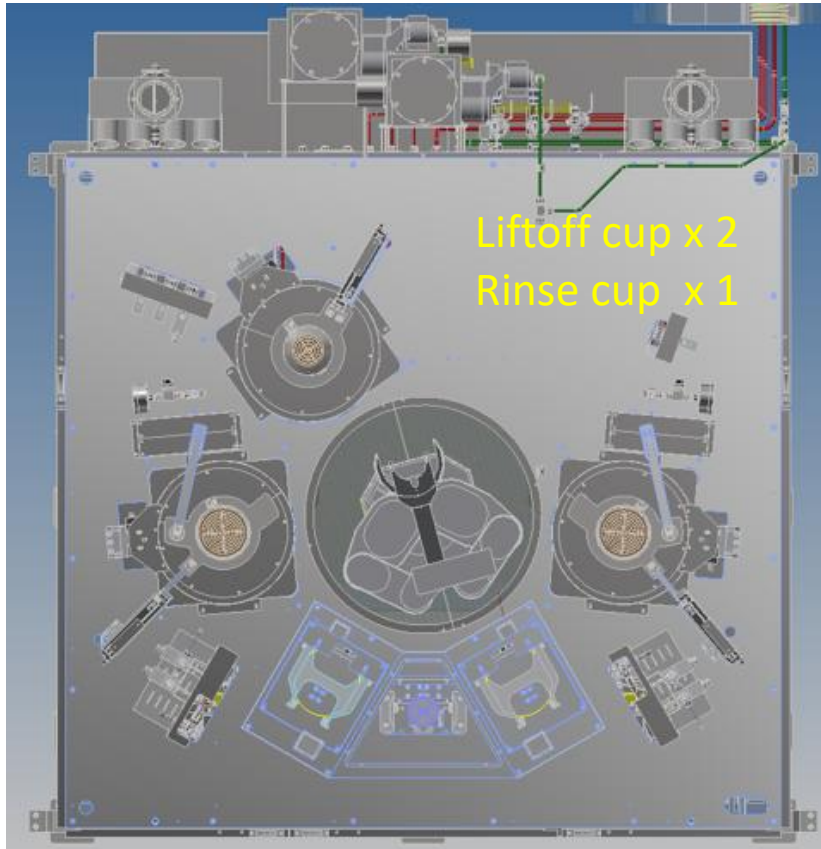
Delivery Record (as of Dec. 2022)

Product	Summary
GaN-LED (include UV-LED)	5 cusotmers in Japan 6 customers in China 1 customer in Taiwa <u>TOTAL 18 sets</u>
GaAs-LED	4 cusotmers in Japan 1 cusotmer in Taiwan <u>TOTAL 5 sets</u>
LD (GaN and GaAs)	8 cusotmers in Japan 1 cusomter in Sigapore <u>TOTAL 9 sets</u>
SAW filter	7 customers in Japan 1 customers in Korea 2 customers in China <u>TOTAL 12sets</u>
MEMS	11 cusotmers in Japan 1 customer in USA <u>TOTAL 12 sets</u>
High frequency (GaN and GaAs)	5 customers in Japan 2 customers in USA <u>TOTAL 7 sets</u>
Others	MR device, SiC power, Si discrete, AlN submount etc... <u>TOTAL 15 sets</u>

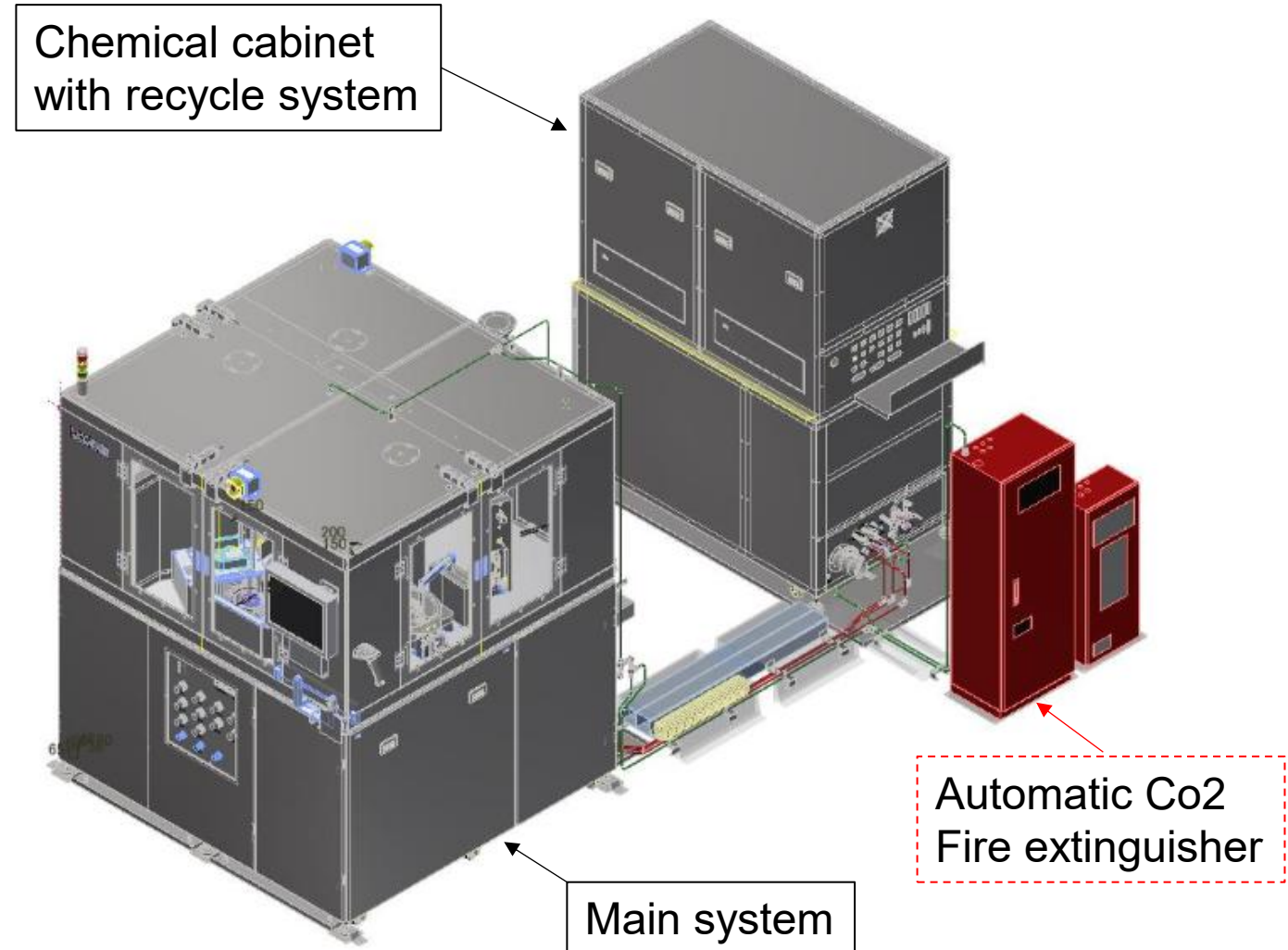


Over 75 sets has been delivered and contributing in production world widely. And its demand is increasing More and more.

3-CUP System Configuration (Max. ϕ 6 inch)



Main system dimension
1600 x 1500 x 1900 mm



ASAP's liftoff machine has very wide process window.

Liftoff process must be more difficult
along with the evolution of device performance.
Fine and complicated pattern, thick metal and so on...

ASAP have many experience in liftoff process
Our latest model has already correspond with
many kinds of device and issue.

We do believe our machine can also solve
new issue which may occurs in near future.

Thank you very much
for your attention.

