SHUWA

Fully Automatic Grinding Equipment Model / SGM-9100

Constant Temperature Water Supply Device Model /SCU-3025

Contents

As of December 21, 2022

SGM-9100 Overview

This is a high-precision cassette to cassette fully automatic grinder that is ideal for difficult-to-grind and brittle materials such as compound semiconductor wafers.

The processing axis adopts a 2-axis, 3-chuck/turntable method.

The processing method is the in-feed grinding method, and it is equipped with IPG control that processes while measuring the thickness of the wafer during processing.

In particular, in order to efficiently grind up to ϕ8 inch SiC, the equipment is highly rigid and the grinding wheel spindle is equipped with a high output motor of 11kW.

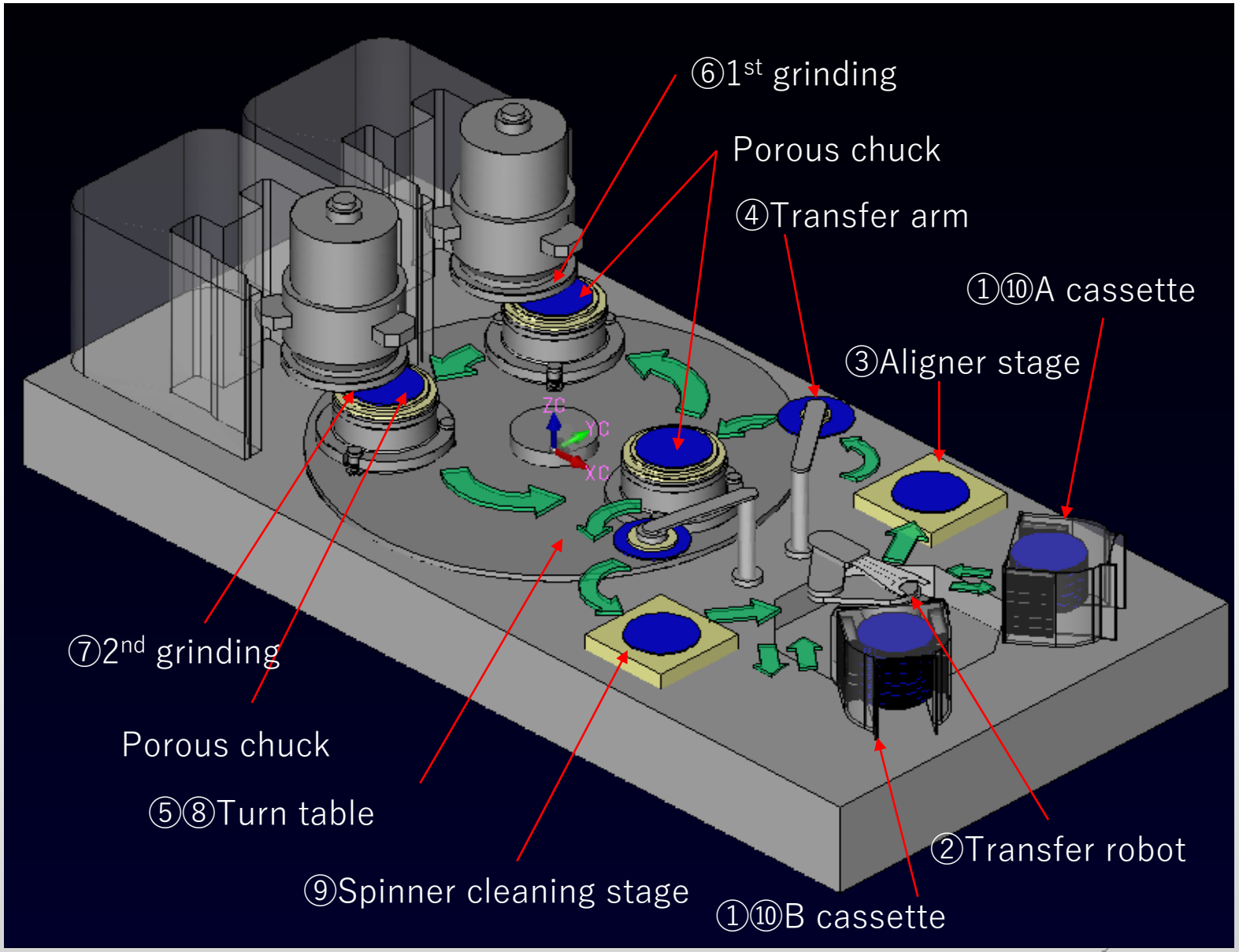
We can propose various applications by combining dedicated grinding wheels suitable for materials and optimal processes for processing compound semiconductor wafers.

SHUWA

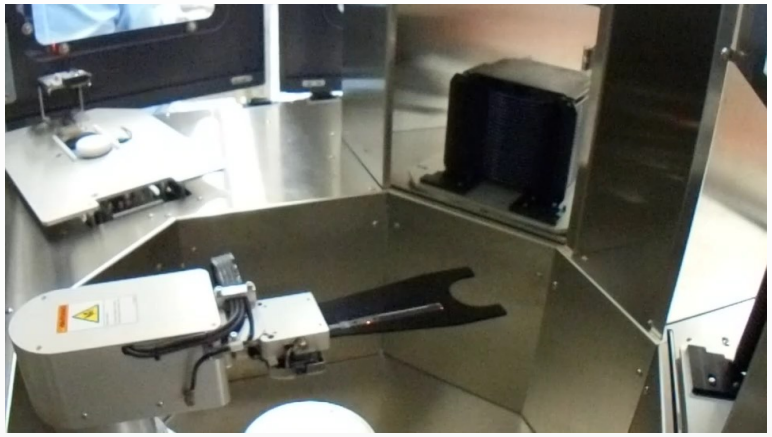
Basic outline specifications, Size, Weight	
Grindable wafer diameter	Φ4, 6, 8 inch
Grinding wheel	Φ300 mm diamond wheel
Spindle rated output	11/kw
Grinding wheel rotation speed	~3,000/rpm
Cassette stage	2set
Aligner	1set
Robot	1set
Transfer unit	2set
Porous chuck stage	3set
Turn table	1set
Grinding axis ・Wafer measuring part	2set (In-process contact gauge type)
Simple cleaning unit	1set
Machine dimensions (W x D x H)	1,407 × 3,377 × 1,864/mm
Machine weight	7,500/kg

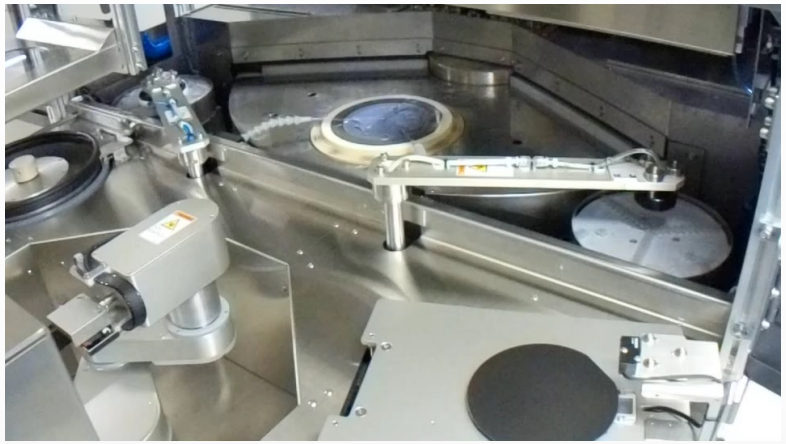
Optional specifications * Others upon request
HOST communication specifications
Barcode reader (Cassette ID, Wafer ID)
Constant Temperature Water Supply Device
Non-contact measuring gauge

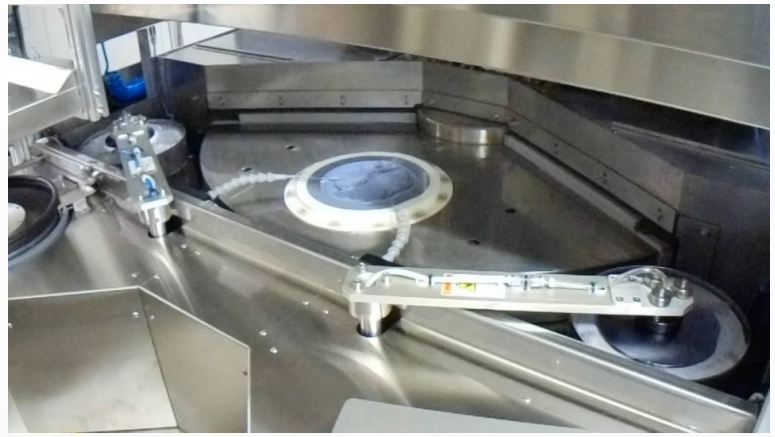
Process flow	
①	A cassette or B cassette loading
②	Robot transfer to aligner
③	Positioning , alignment
④	Wafer set to turn table
⑤	Turntable rotation (Transfer at three locations on the chuck axis)
⑥	1st grinding （Z1 spindle）
⑦	2nd grinding （Z2 spindle）
⑧	Turntable rotation
⑨	Wafer cleaning/drying
⑩	A cassette or B cassette unloading

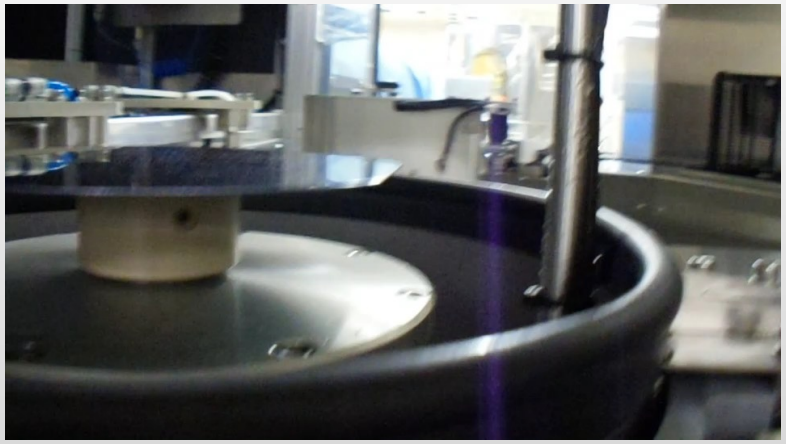


Motion movie each area

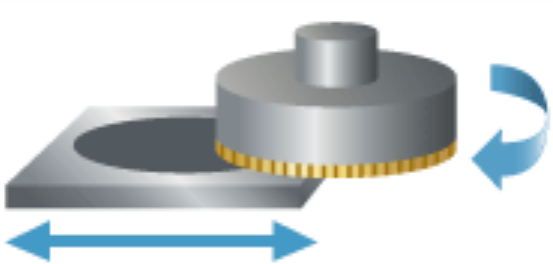




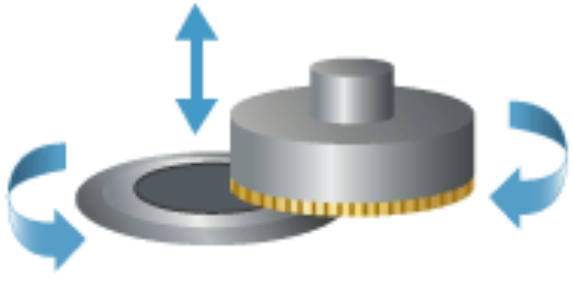




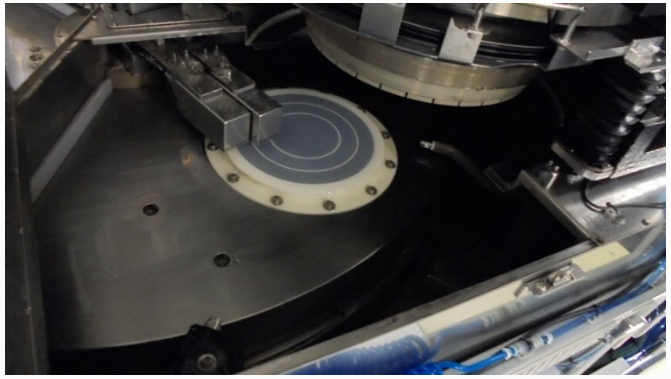
Wafer grinding technology details①

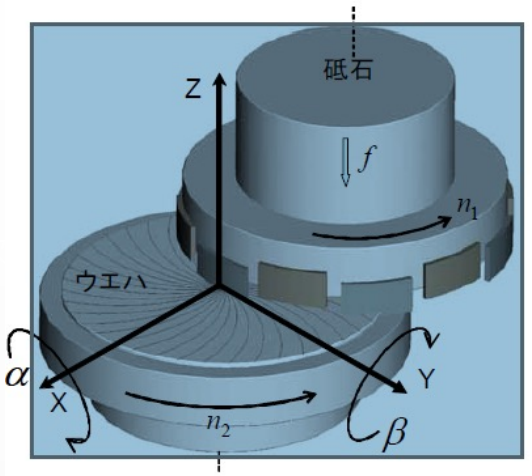


Creep feed grinding image



Infeed Grinding image





Wafer grinding methods include creep feed grinding and infeed grinding.
Creep-feed grinding is a method in which the grinding wheel shaft rotates while the wafer is held and fixed, and the grinding wheel shaft is lowered outside the grinding area to process in the direction of the arrow.

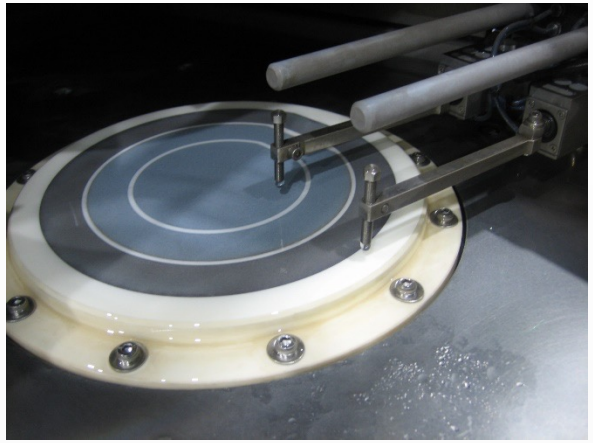
Grinding while controlling the IPG is impossible because the entire wafer surface is the processing area. Processing always starts at the outer edge of the wafer.

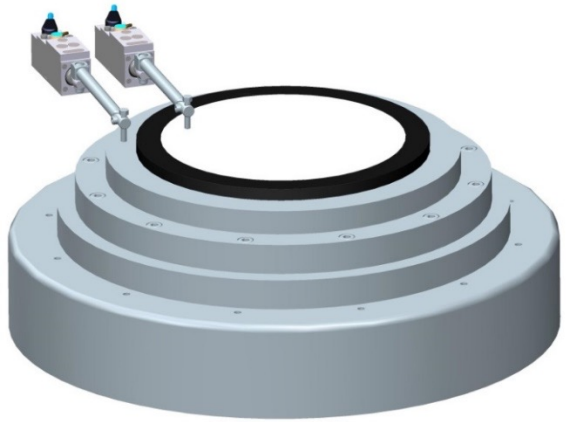
SGM-9100 is an infeed grinding system.

Infeed grinding, in which the grinding marks are horizontal when viewed from the top, is performed by rotating the table while holding the wafer, and moving the grinding wheel shaft in the downward direction of the arrow.

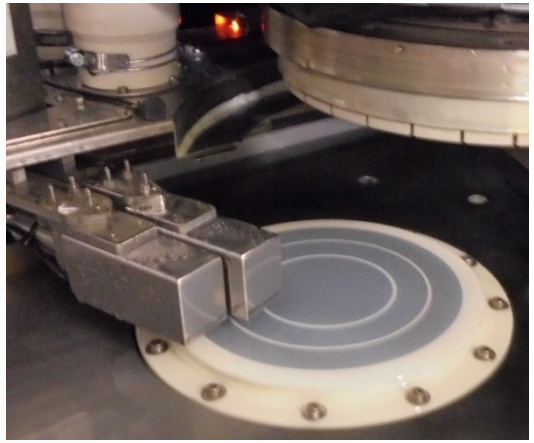
Since the processing area is half of the wafer, it supports grinding while performing IPG control.
When viewed from the top, the grinding marks spread out from the center.
Grinding starting direction can be selected from two types, from the center and from the edge, by changing the rotation direction of the grinding wheel.

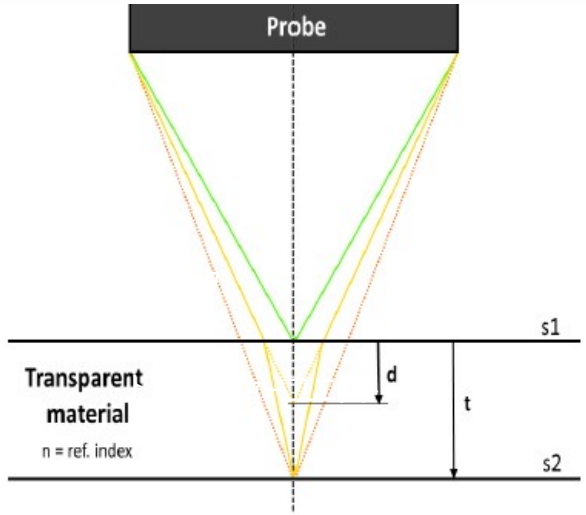
Wafer grinding technology details②





Contact gauge type





Non-contact gauge type(optional)

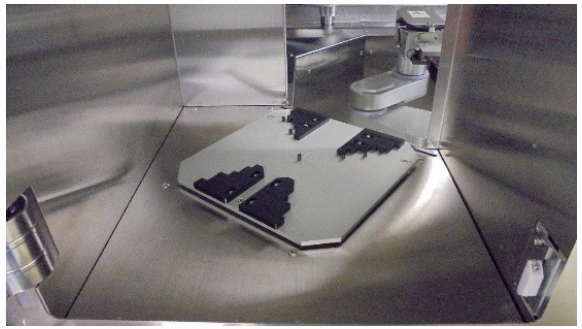
During wafer processing, the position of the grinding wheel axis is controlled while measuring the wafer thickness based on the difference between the reference surface and the workpiece surface. When the grinding wheel shaft reaches the set thickness, it moves to the end of processing. This method is called in-process control.

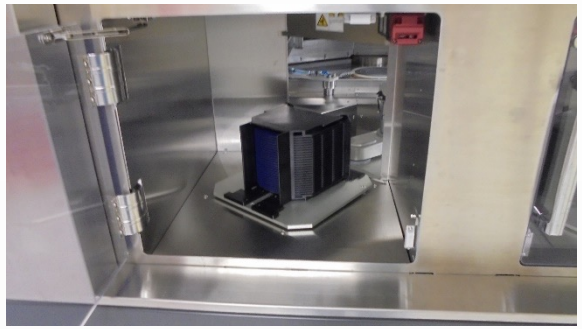
Measuring instruments for measuring wafers during processing can be broadly divided into contact and non-contact types.
In the contact type, processing is performed with the stylus in contact with the reference surface and wafer surface. On the other hand, the non-contact type measures both the reference surface and the wafer surface without contact.

The non-contact measuring principle measures thickness by reflection of laser light. Both transparent and opaque objects can be measured.

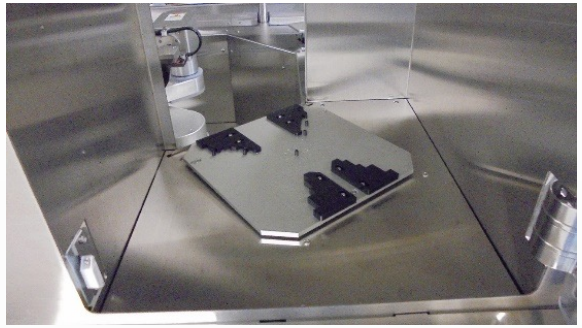
Wafer transfer section configuration①

B cassette part



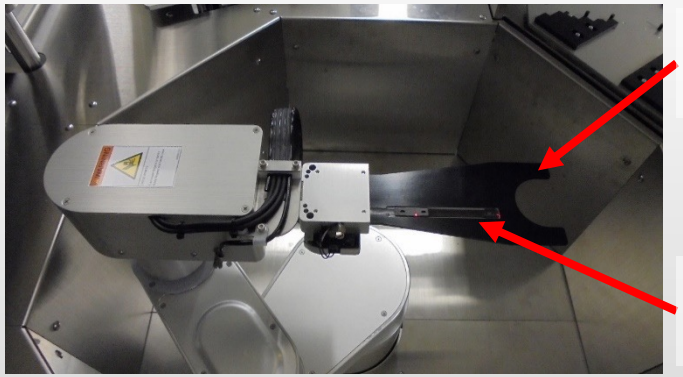


A cassette part



Equipped with semi-standard 4/5/6/8 inch compatible cassette blocks as standard
Equipped with cassette lift detection and cassette size error detection functions during full-auto operation
The operating height of the robot hand can be fine-tuned using parameters.

Transfer robot



Ceramic robot hand
(Conductive Teflon processing, treated to prevent static electricity)

Double detection function for wafers with a separate load sensor in addition to vacuum detection to prevent incorrect detection of wafers

The robot supports loading/unloading from the cassette, transfer to the position table, and transfer from the spinner table.
Transfer method supports open flow and same flow
The robot reversing operation during loading/unloading can be changed depending on the situation.

Wafer transfer section configuration②

Porous ceramic is used for the transfer arm and transfer pad from the chuck table to the spinner table to prevent scratches on the grinding surface.

Transfer arm 2

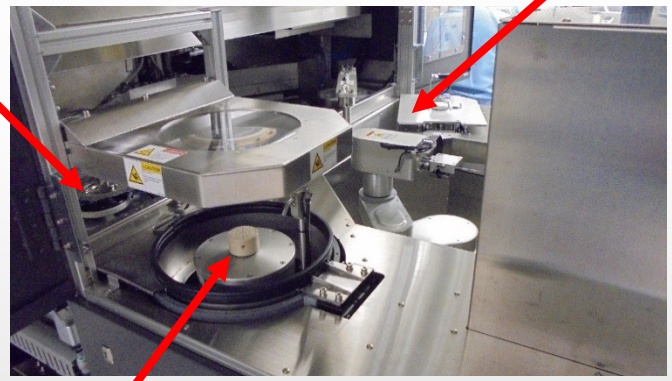
・Cleaning of T2 pad before receiving wafer
・Wafer backside cleaning after processing

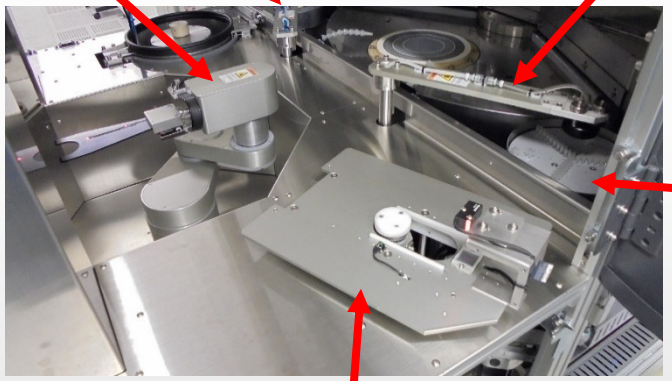
Back side cleaning(T 2)

Transfer robot

Transfer arm from position table to chuck table

Transfer arm1





Back side cleaning(T 1)

・Wafer backside cleaning before processing

Left side

Right side

Spinner cleaning stage

Washing and drying process before cassette storage

Aligner stage

Wafer alignment processing, orientation flat/notch detection function

Processing part configuration

Attach the grinding wheel and process the wafer

Spindle(Z2)

Spindle(Z1)

Chuck table / cleaning area

Chuck table cleaning brush/wafer cleaning brush

・Clean the table before transfer arm 1 sets the wafer
・Clean the table after oilstone
・Cleans the surface of the wafer after pre-processing where the transfer arm 2 receives the wafer

Chuck table cleaning oil stone

・Clean the chuck table before transfer arm 1 sets the wafer

Constant Temperature Water Supply Device SCU-3025(Optional)

This is a unit for stably supplying grinding water and cooling water temperature for each axis to maintain the stability of high-precision grinding. A device that controls the temperature of grinding water and cooling water separately.

Grinding water is drained to the equipment side drain after being supplied to the grinding equipment.
The cooling water is returned to the constant temperature water supply system and circulated for use.

Grinding water is kept within ±1.0° C of the set temperature, and the incoming water temperature is once cooled to -1.0° C by a cooler according to the set temperature, and then circulated in the tank inside the equipment.
When supplying to the grinding equipment, it is heated by a heater and supplied to the grinding equipment.
Cooling water is ±1.0°C or less against the set temperature, and the returned cooling water is cooled by a cooler and circulated in the grinding equipment and inside the equipment.