

MACOHO W E T B L A S T

Plating / thin film / coating pretreatment

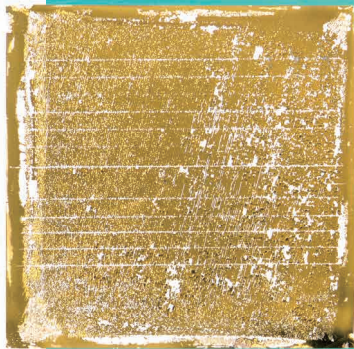
Improved Adhesion to Super Engineering Plastics, CFRP, and Glass

The anchor effect provided by nano-level fine unevenness having no time dependency, and the cleaning power, which scrapes a thin film with foreign matter from the surface, contribute to improved coating adhesion regardless of the base material such as super engineering plastic, CFRP, metal, and ceramic.

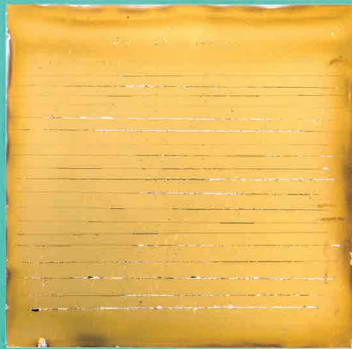
This method is also suitable for plating, coating, painting, and pretreatment for automobiles and 5G products.

Ti coating film formation

Film type: Ti
Base material: Glass



Without pretreatment



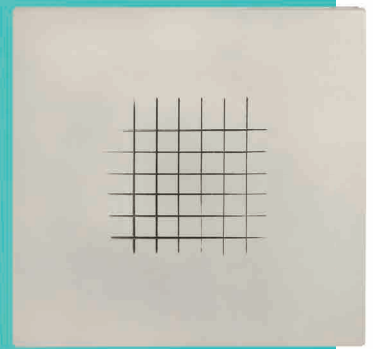
Film formed after wet blasting

Plating on PPS

Film type: Plating
Base material: Super engineering plastic (PPS)



Without pretreatment



Plated after wet blasting

The materials can be easily coated and plated.

POINT

Regardless of the material Suitable for any material such as resin, metal, or ceramic.

Nano-anchor effect Nano fine uneven surfaces are formed and the anchor effect is expected.

No chemicals needed No chemicals are used for physical etching.

No time dependency

There is no time dependency due to the wettability improved by surface area expansion.

No deterioration

Since processing heat is not generated, no deformation or deterioration occurs.

Fast batch processing

The etching rate is larger than that of other surface etching methods. The desired etching amount can be obtained in a short time.

No residues

There is almost no contamination by particles or no foreign matter residue.

Nano surface treatment

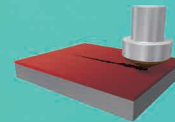
Surfaces are scraped at the nano level to completely remove foreign matter.

CFRP, Ti, SUS, and coatings

Adhesive Strength Between Different Materials : **Twice or More**

Adhesive strength between different materials can be greatly increased by wet blasting, which cleans materials and forms fine uneven surfaces to expand adhesion areas and improve the wettability.

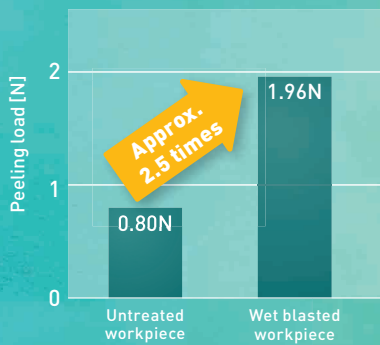
*What is the adhesion scratch test?



The adhesion scratch test is a method of measuring coating adhesion by scratching the test object with a diamond indenter while a load is being applied.

Results of scratch test

CFRP × Acrylic coating



Untreated workpiece

Load: approx. 0.80 N (start of peeling)

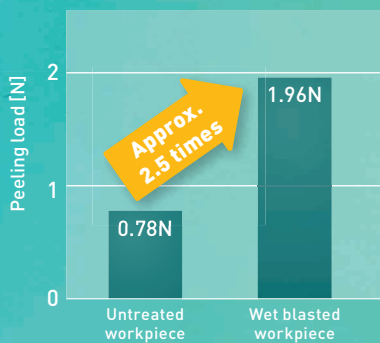


Wet blasted workpiece

Load: approx. 1.96 N (the maximum load)



Ti × Urethane coating



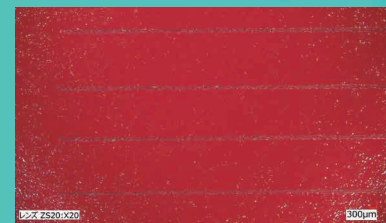
Untreated workpiece

Load: approx. 0.78N (start of peeling)

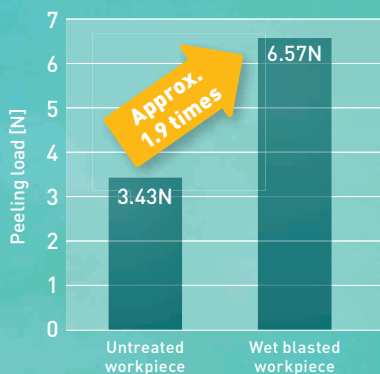


Wet blasted workpiece

Load: approx. 1.96 N (the maximum load)



SUS × TiN coating



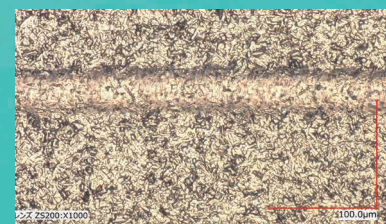
Untreated workpiece

Load: approx. 4.27 N (with peeling)



Wet blasted workpiece

Load: approx. 4.27 N (without peeling)



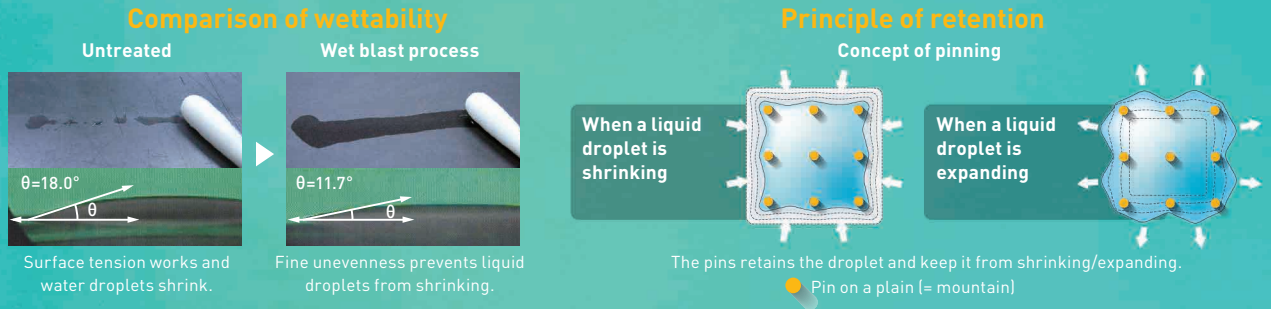
Wet blast surface processing applications

Principle of Improving Adhesive Strength

Complete removal of foreign matter



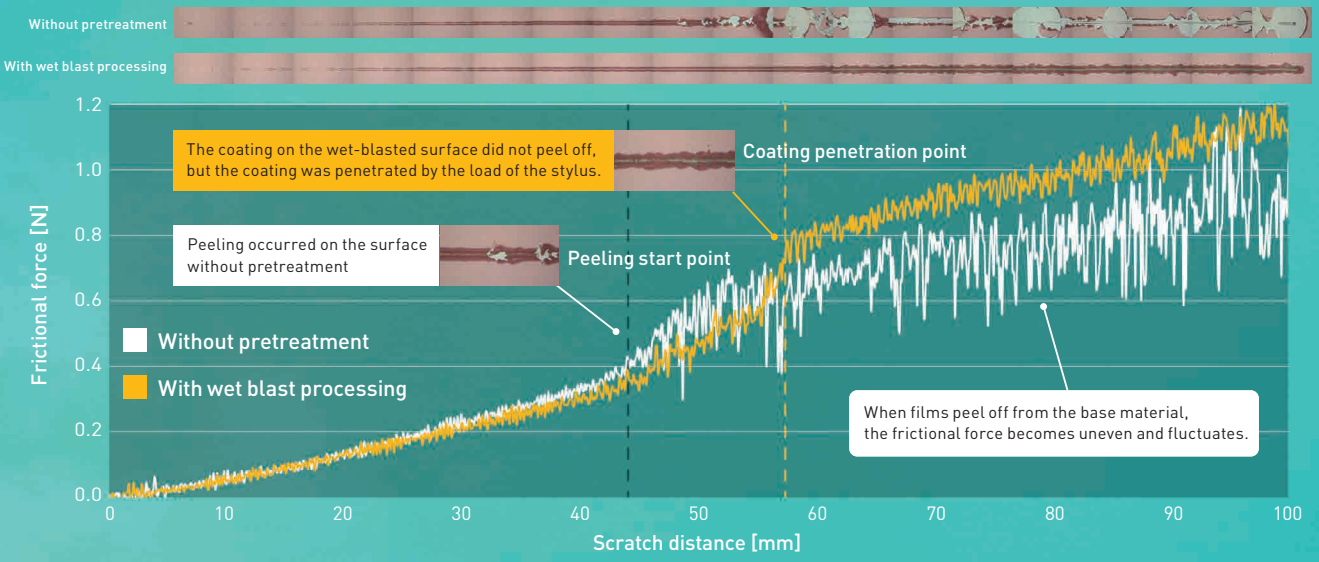
Improved wettability and retention



Example of improved adhesion: CFRP and coating

Measurement method: Scratch testing Sample base material: CFRP Sample coating: Acrylic resin coating
Wet blast process conditions: A#320 (abrasive), 0.2 MPa (air pressure)

***What is the adhesion scratch test?**
The adhesion scratch test is a method of measuring coating adhesion by scratching the test object with a diamond indenter while a load is being applied.



Super Engineering Plastics (PPS)

Processing surface **comparison**

Appearance after
shield plating

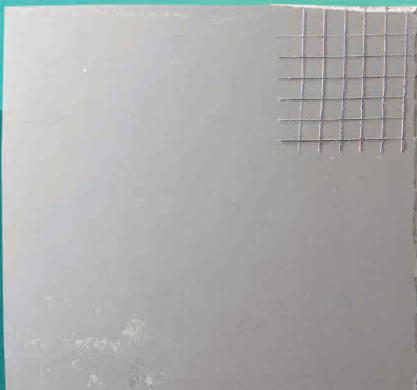
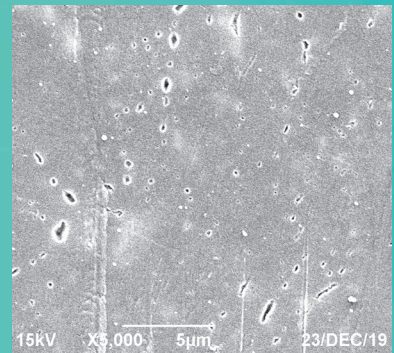
Surface condition of PPS
before plating



Without
pretreatment

Surface roughness
Ra 0.048 μm
Rz 0.255 μm

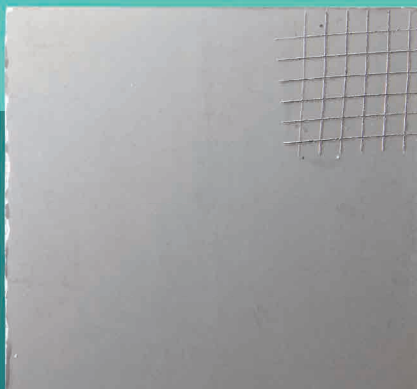
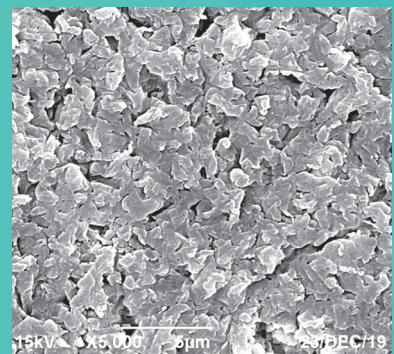
Enlarged view of the surface



Processing by
#2000

Surface roughness
Ra 0.040 μm
Rz 0.232 μm

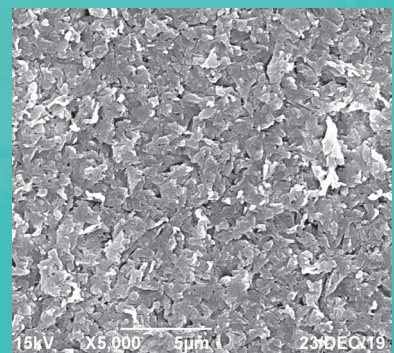
Enlarged view of the surface



Processing by
#4000

Surface roughness
Ra 0.039 μm
Rz 0.214 μm

Enlarged view of the surface



Equipment lineup

Automatic type



PFE 300 / 600

Wide gun 370 / 630mm Full automatic Conveyor type
 Cleaning / Drying Applicable to large workpieces
 Applicable to roll-to-roll process

- Up to 630 mm wide guns are used for processing of large workpieces.
- The upper and lower guns can process the top and bottom surfaces at the same time.
- Perform all the processes up to cleaning/draining continuously and discharge workpieces in a clean state.

Size 2100(W)×1775(D)×1800(H)mm / 2125(W)×2125(D)×1800(H)mm
 Processing range Max. width 350/610 mm Length 200-700mm Thickness 0.2-2.0mm
 Blast gun Wide gun 370 / 630mm×1.0mm (One each at the top and bottom)
 Power supply 200 V AC, 50/60 Hz, 3 phases
 Air consumption 9.0 / 14.0m³/min
 (NTP at 0.2 MPa of preset blast air pressure)

For small and medium lot production



Sigma

Wide gun 600mm X-axis Automation
 Applicable to large workpieces

- Capable of uniform processing (up to 800 × 600 mm surface) with 600 mm wide gun.
- When the door opens and closes it slides to the top, and no water drops on the floor.
- Allows easy programming of blast projection and gun operation.

Size 1550(W)×1530(D)×2100(H)mm
 Processing range 800×600mm
 Blast gun Wide gun 600mm
 Power supply 200 V AC, 50/60 Hz, 3 phases
 Air consumption 6.2m³/min
 (NTP at 0.2 MPa of preset blast air pressure)

For R&D



Robot Blast

Wide gun 180 mm robot Automation

- Capable of processing workpieces of complex shape by using a 6-axis articulated robot and rotary table.
- Equipped with a wide gun capable of uniformly processing the entire surface.
- Allows easy programming of blast projection and gun operation.

Size 1100(W)×1500(D)×1950(H)mm
 Processing range 400(W)×400(D)×300(H)mm
 Blast gun Wide gun 180mm
 Power supply 200 V AC, 50/60 Hz, 3 phases
 Air consumption 3.8m³/min
 (NTP at 0.25 MPa of preset blast air pressure)



mini PFE 100 / 200

Wide gun 110 / 220mm Full automatic Conveyor type
 Cleaning/Drying Applicable to strip workpieces

- Compact design ideal for strip and plate-shaped small workpieces.
- Realizing both sides processing of the front and back by mounting the gun up and down.
- Maintenance of the drive, blasting, and cleaning part is possible only by opening the cover.

Size 1200(W)×1250(D)×1600(H)mm / 1700(W)×1600(D)×1650(H)mm
 Processing range Width 20-100mm / 20-200mm Length 100-250mm Thickness 0.1-1.5mm
 Blast gun Wide gun 110 / 220mm×1.0mm (One each for top and bottom)
 Power supply 200 V AC, 50/60 Hz, 3 phases
 Air consumption 4.3 / 8.5m³/min
 (NTP at 0.2 MPa of preset blast air pressure)



Lambda Type II

Wide gun 320mm X-axis Automation

- Drives a wide gun with the X-axis to batch process a range of up to 600 x 300 mm.
- Cope with various types of workpieces by changing the jig or gun bracket.
- Allows easy programming of blast projection and gun operation.

Size 1350(W)×1525(D)×1930(H)mm
 Processing range 600×300mm
 Blast gun Wide gun 320mm
 Power supply 200 V AC, 50/60 Hz, 3 phases
 Air consumption 5.0m³/min
 (NTP at 0.25 MPa of preset blast air pressure)



Jr. Type II

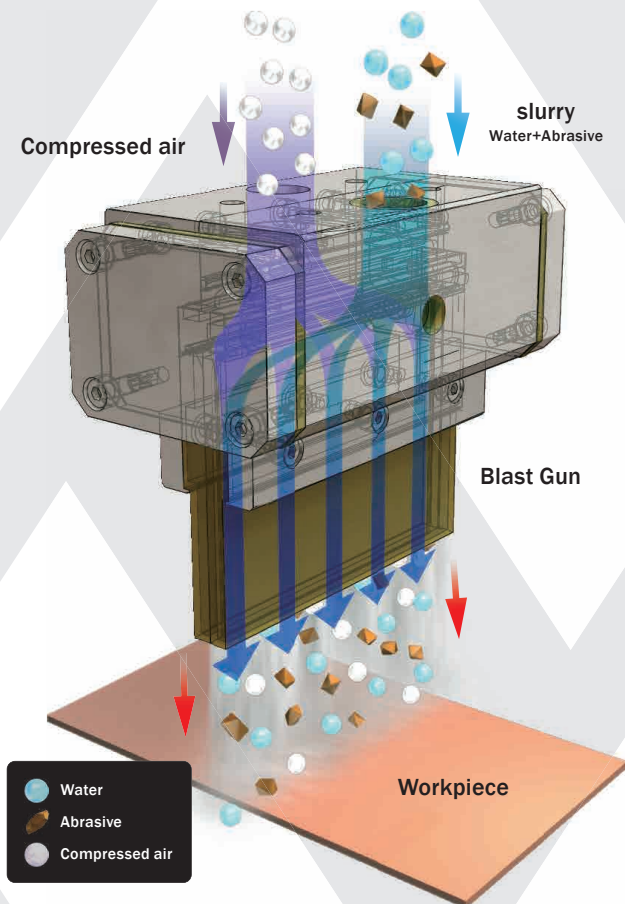
Wide gun 160 mm X-axis Automation

- Easy to introduce because of its compact design and very little dust.
- Uniform surface processing with 1-axis drive and a wide gun.
- Allows easy programming of blast projection and gun operation.

Size 850(W)×920(D)×1450(H)mm
 Processing range 300×160mm
 Blast gun Wide gun 160mm
 Power supply 200 V AC, 50/60 Hz, 3 phases
 Air consumption 2.0m³/min
 (NTP at 0.25 MPa of preset blast air pressure)

Surface Etching Using Water, Abrasives, and Compressed Air

What is wet blasting?



Wet blasting is a non-chemical etching method that accelerates slurry, which is a mixture of abrasive and water, with compressed air and projects it against the target object to process its surfaces.

Features

1 Curved surfaces and three-dimensional objects can be processed

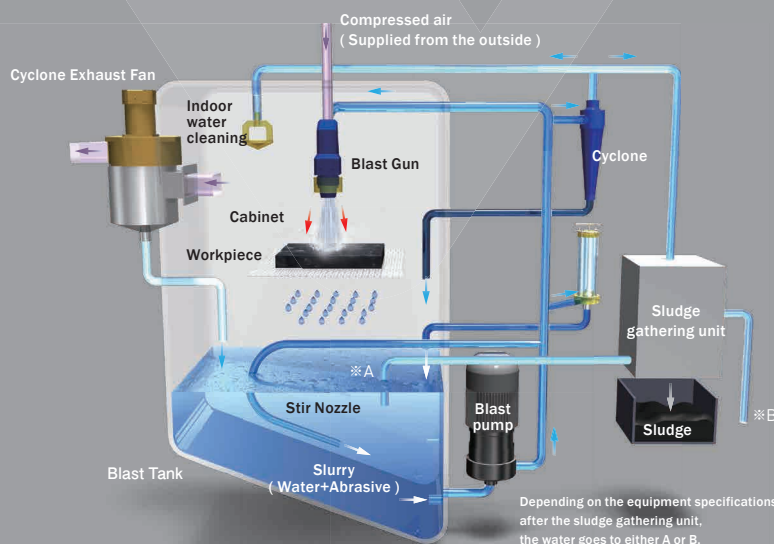
Since the rotating tool is not pressed against the workpiece, it is possible to process not only curved surfaces but also steps and cavities.

2 Fine abrasives can be used

3 to 100 μm abrasives can be used because of the water transport effect. The fine abrasive makes processing with submicron precision possible.

3 High productivity

Wet blasting provides batch processing of a large area using a wide gun.



MACOHO's Wet Blast System

This system pumps up the slurry, mixes it with compressed air using the blast gun, and then projects the slurry, which is accelerated and dispersed.

The slurry is circulated and reused to reduce waste liquid.

Thanks to the system's advanced automation, the only task required during continuous operation is to supply the abrasive.



Base treatment for adhesion

Comparison of surface processing methods

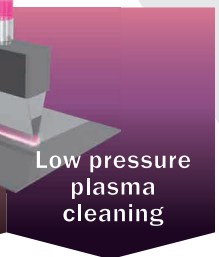
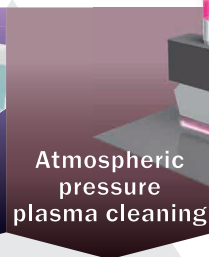
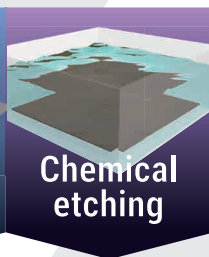
Accelerates water and an abrasive with compressed air and projects the mixture against workpieces to be processed or cleaned.

Projects an abrasive against workpieces with compressed air to process them.

Chemically processes workpieces in a chemical solution.

Projects high-energy electrons and ions against work pieces to generate new substrate and remove dirt.

process



Uniformity of treated surface	<p>Good</p>	<p>Large areas are processed unevenly because the nozzle opening is narrow.</p>	<p>Good</p>	<p>Possible with wide gun</p>	<p>Possible with large area electrodes</p>
Wettability	<p>Good</p>	<p>Depends on the surface state before processing.</p>	<p>Good</p>	<p>Temporarily good, but performance rapidly deteriorates.</p>	<p>Temporarily good, but performance rapidly deteriorates.</p>
Presence of residue	<p>Very few abrasive residues remain.</p>	<p>Abrasive residues remain.</p>	<p>None</p>	<p>None</p>	<p>None</p>
Fine processing	<p>Good</p>	<p>Abrasives less than 50 μm are difficult to use.</p>	<p>Good</p>	<p>Good</p>	<p>Excellent</p>
Material selectivity	<p>Materials and types of contamination do not matter because of physical treatment.</p>	<p>Materials and types of contamination do not matter because of physical treatment.</p>	<p>For some materials there are no suitable chemicals.</p>	<p>Organic substances only</p>	<p>Both inorganic and organic substances can be used depending on the reaction gas to be used.</p>
Processing time	<p>Fast</p>	<p>Fast</p>	<p>Fast</p>	<p>Fast</p>	<p>Slow</p>
Dust	<p>Little dust generation</p>	<p>Dust work</p>	<p>None</p>	<p>None</p>	<p>None</p>
Equipment cost		<p>Low</p>			<p>High</p>



MACOHO

The benefits of Wet Blast

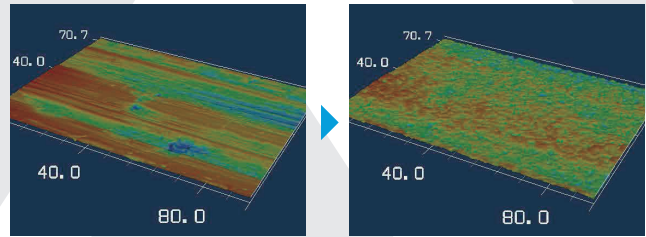
Roughness

Create fine and controllable dimples

Create a wide range of dimples using fine abrasives and controlled fluid

Wet Blast creates dimples on the surface by peeling soft parts of its material using the blasting power and transcribing abrasive shapes. A wide range of abrasives between #60 ~ #4000 are available which enables easy control of roughening.

Glass roughening sample



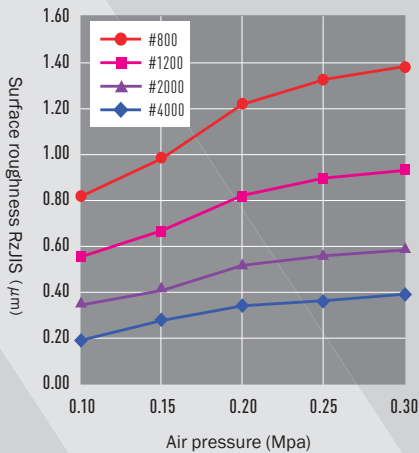
Before processing

After wet blast processing

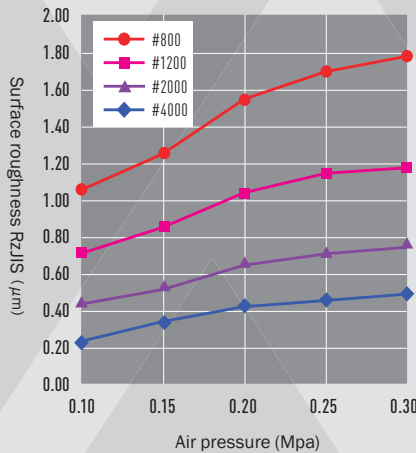
Processing data by materials using fine abrasives

Roughness

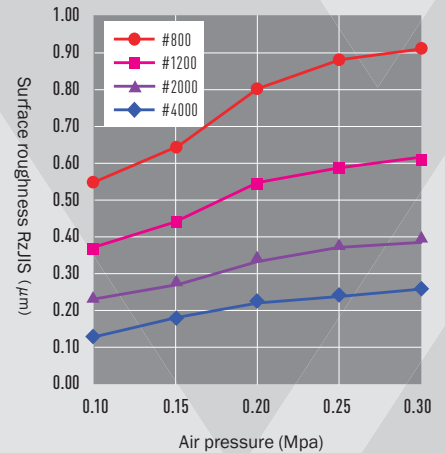
Roughness of Cu surface



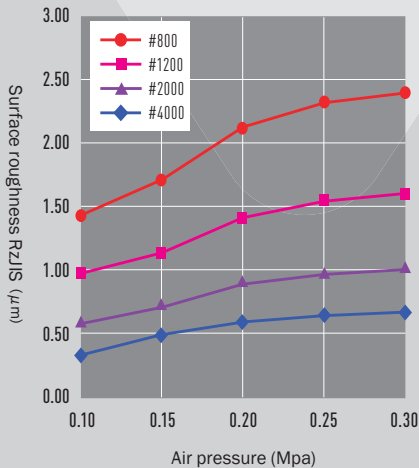
Roughness of AL surface



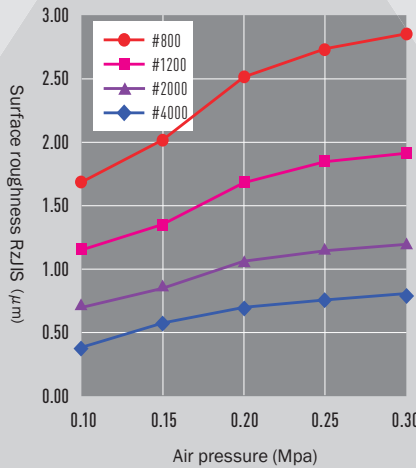
Roughness of SUS surface



Roughness of PI surface



Roughness of glass surface



Particle diameter

- #800 = 14μm
- #1200 = 9.5μm
- #2000 = 6.7μm
- #4000 = 3.0μm

Processing condition

- Wide gun applied
- Air pressure : 0.20MPa
- Processing speed : 20mm/s
- Projection distance : 20mm
- Projection angle : 90°

Note

The data above may differ depending on processing condition of roughness of undone surface or hardness of material

*There is a certain variation in roughness (±5 ~ 7%)