



Long continuous production with stable and high quality is possible.

# Descaling of Ball Screws and the Finishing Method

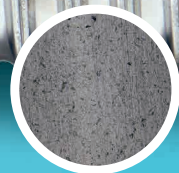
Descaling of ball screws by wet blasting has various advantages over buffing and brush polishing. The following describes the unique features of wet blasting, which achieve stable production with high quality and reduce the costs and processes.



Before processing



After wet blast processing



Enlarged surface photograph

Enlarged surface photograph

## Features of descaling by wet blast

### Smooth surface

The use of a fine stainless abrasive results in a smooth surface. The surface becomes shiny with fewer scratches and dents.

### Shortened processes

Mixing of scales and crushed particles with water prevents dust generation and improves the working environment.

### Stable quality

Long operation using a long-life stainless abrasive is possible, minimizing quality variations and achieving stable quality.

### Compatible with complex shapes

Since this wet processing is performed according to the shape of a workpiece, the grooves of a ball screw can be evenly processed regardless of the shape of the screw.

# MACOHO WET BLAST



## Practical example 1

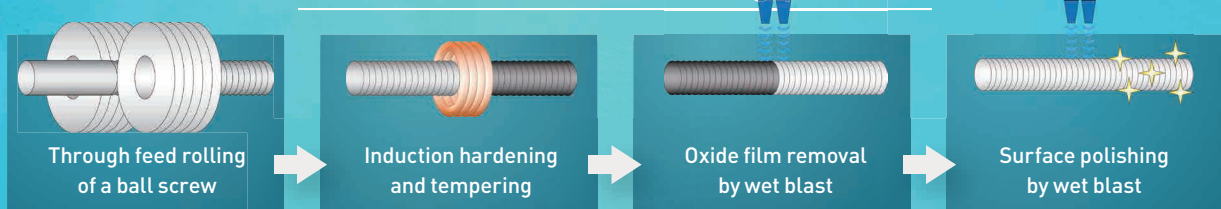
Film removal and surface polishing of rolled ball screw shafts and nuts

Data provided by Ogiso Kogyo Co., Ltd.

# Wet blasting reduces surface roughness by 40% and operating noise from 60.2 dB to 56.9 dB.

The measurement data of the wet blast process and a conventional process (buffing) are provided by Ogiso Kogyo Co., Ltd., which uses our wet blast system.

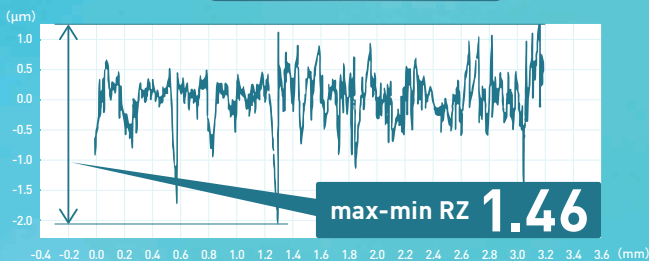
## Ball screw manufacturing process



## Measurement analysis and evaluation

There is a large difference in variations in roughness values Ra and Rz between wet-blasted and buffed products.

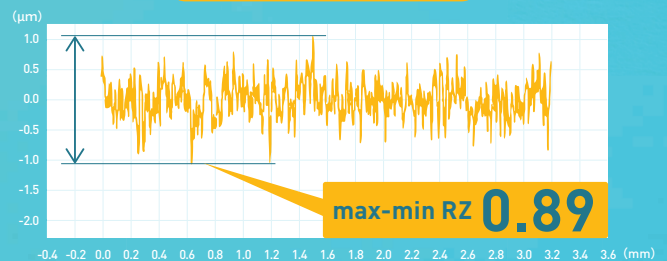
### Buffed product



Surface roughness	Ra	Rz	Rzjis
Average	0.27	1.95	1.37
max-min	0.15	1.46	0.78

Operating noise of the ball screw ..... **60.2dB**

### Wet-blasted product



Surface roughness	Ra	Rz	Rzjis
Average	0.27	2.05	1.65
max-min	0.07	0.89	0.58

Operating noise of the ball screw ..... **56.9dB**



Practical example 2

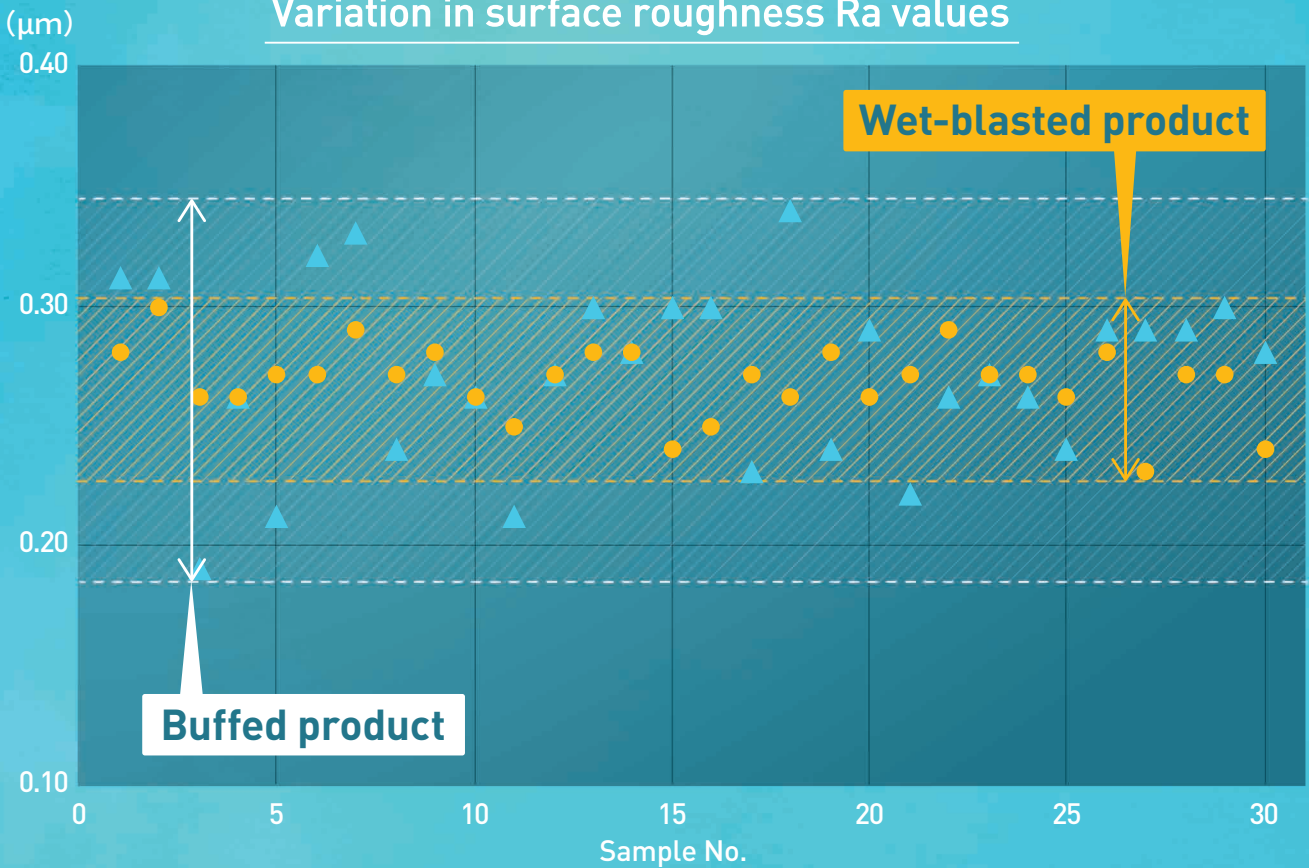
Film removal and surface polishing of rolled ball screw shafts and nuts

Data provided by Ogiso Kogyo Co., Ltd.

# Surface Roughness Variations Reduced to $\frac{1}{2}$

The dispersion evaluation of the measured values of each 30 samples of wet-blasted products and conventionally processed (buffed) products is graphed.  
 The graph shows standard deviations as a dispersion evaluation index.  
 Both the graph and the numerical data indicate that the roughness variation of wet-blasted products is small.

Variation in surface roughness Ra values



Standard deviation	Buffed product <b>0.04</b>	Wet-blasted product <b>0.02</b>
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Advantages and disadvantages of each method

# Comparison of wet blasting and other methods

The table below shows a comparison of wet blasting and other methods used as a ball screw shaft manufacturing process.

As a descaling process, wet blasting was compared with shot blasting.

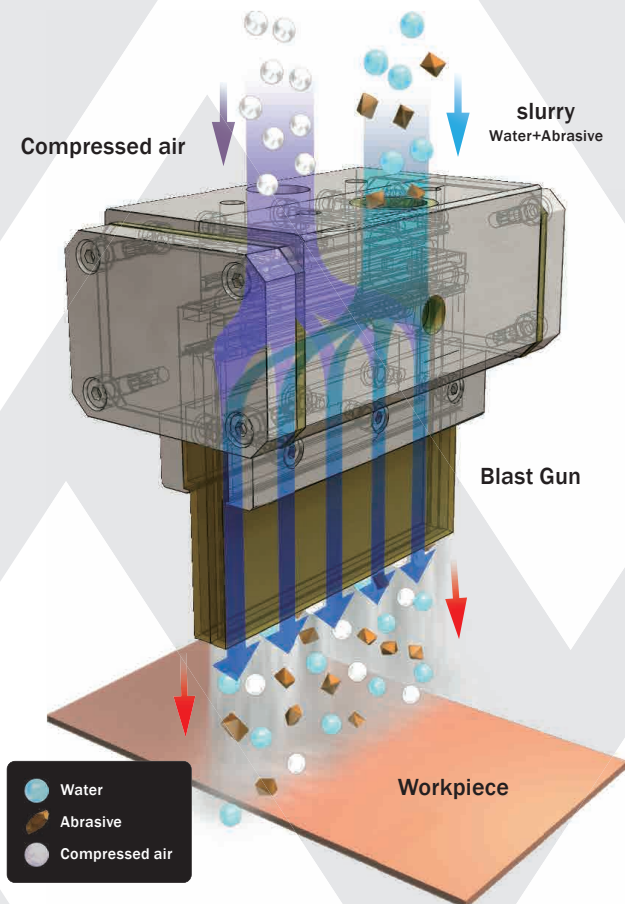
As a finishing process, it was compared with brush polishing, buffing and tape polishing.

In addition, if wet blasting is used, both descaling and finishing processes can be done by one unit.

	Wet Blast	Shot blast	Brush polishing only	Brush polishing + Buffing	Tape polishing
Finish	○ Shiny smooth surface	✕ Rough finish	△ Rough finish	◎ Shiny surface	◎ Shiny surface
Damage to workpieces	○ Slight shape change	✕ Deep dent	✕ Deep scratches and shape change	△ Shape change	△ Adjustment is needed
Variable processing force	○ Only pressure is changeable	✕ Uncontrollable	△ Brush replacement required	△ Buff replacement required	△ Tape replacement required
Quality stability	○ Media density control only	△ Variation in quality	✕ Variation in quality due to wear, frequent replacement	△ Variation in quality due to wear, frequent replacement	✕ Variation in quality due to settings, frequent replacement
Generation of dust	○ Not generated due to process using liquid	✕ Generated due to process using powder	✕ Partial disposal required	✕ Partial disposal required	△ Not generated due to coolant use
Generation of heat	◎ water treatment	✕ heating occurs	✕ heating occurs	✕ heating occurs	✕ heating occurs
Rinsing and drying in the unit	○ Rinsing and drying	✕ Not available in the unit	✕ Not available in the unit	✕ Not available in the unit	✕ Inlining not possible

## Surface Etching Using Water, Abrasives, and Compressed Air

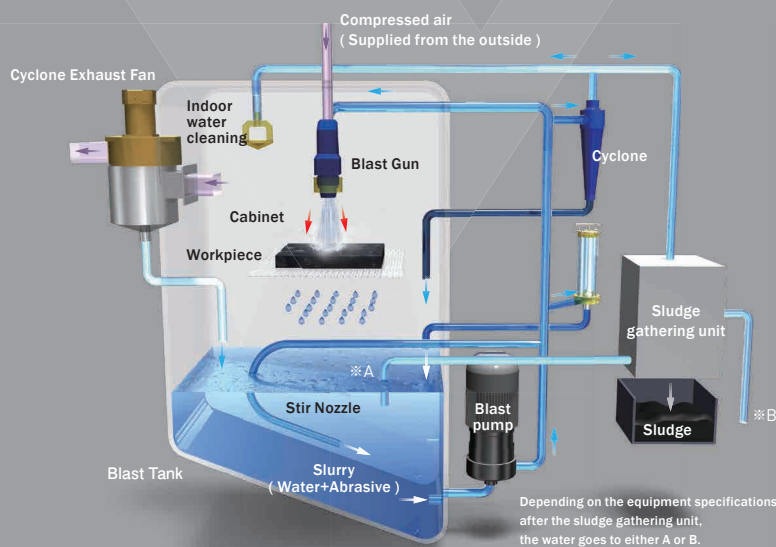
# What is wet blasting?



Wet blasting is a technique to project a mixture of abrasive and water at high speed with compressed air against a material such as metal, plastic, or ceramic to clean, process, and modify its surfaces. It is a wet processing method that allows the use of abrasives as small as several  $\mu\text{m}$  in diameter and is suitable for fine processing.

### Features

- 1 Precise surface finish**  
 This wet processing method allows the use of fine abrasives, which results in fine uneven surfaces after processing.
- 2 Reduced operating time by handling multiple operations simultaneously**  
 Grinding and cleaning can be done at the same time, reducing the operating time.
- 3 No dust is generated**  
 Mixing of scales and crushed particles with water prevents dust generation and improves the working environment.



## 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.

# Equipment lineup

## Automatic type



### Wet-blasting cell for ball screws

Two wide guns 90mm Full automatic Roller transport method  
Rinsing and draining Independent control of blast air pressure

- Mixing of scales and crushed particles with water prevents dust generation and improves the working environment.
- Fully automatic processing from feed to discharge of workpieces.
- The newly developed wide gun achieves very effective blast projection.

Size 2100(W)×1675(D)×1600(H)mm  
Processing range  $\phi$ 10 to 50 mm × 1000 mm or longer  
Blast gun Two wide guns 2.5 × 90mm  
Power supply 200 V AC, 50/60 Hz, 3 phases  
Air consumption 4.0 m<sup>3</sup>/min (NTP, at a blast air pressure of 0.25 MPa)

## 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 6.2m<sup>3</sup>/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 3.8m<sup>3</sup>/min  
(NTP at 0.25 MPa of preset blast air pressure)



### Wet-blasting cell for steel bars

$\phi$ 11 L compact gun × 12 Full automatic  
Rinsing and draining Rinsing and draining

- All in one unit that performs not only oxide film removal but also rinsing and draining.
- Fully automatic processing from feed to discharge of workpieces.
- The guns surrounding the steel bar remove oxide films with high power.

Size 2060(W)×1815(D)×2125(H)mm  
Processing range  $\phi$ 30 mm or smaller × 1400mm or larger  
Blast gun  $\phi$ 11 L compact gun × 12  
Power supply 200 V AC, 50/60 Hz, 3 phases  
Air consumption 21.0 m<sup>3</sup>/min (NTP, at a blast air pressure of 0.4 MPa)



### 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 5.0m<sup>3</sup>/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 2.0m<sup>3</sup>/min  
(NTP at 0.25 MPa of preset blast air pressure)