UPZ210LiⅡ/UPZ210LiⅡ-2

Ultra Precision Micro Profile Grinding Machine

Okamoto
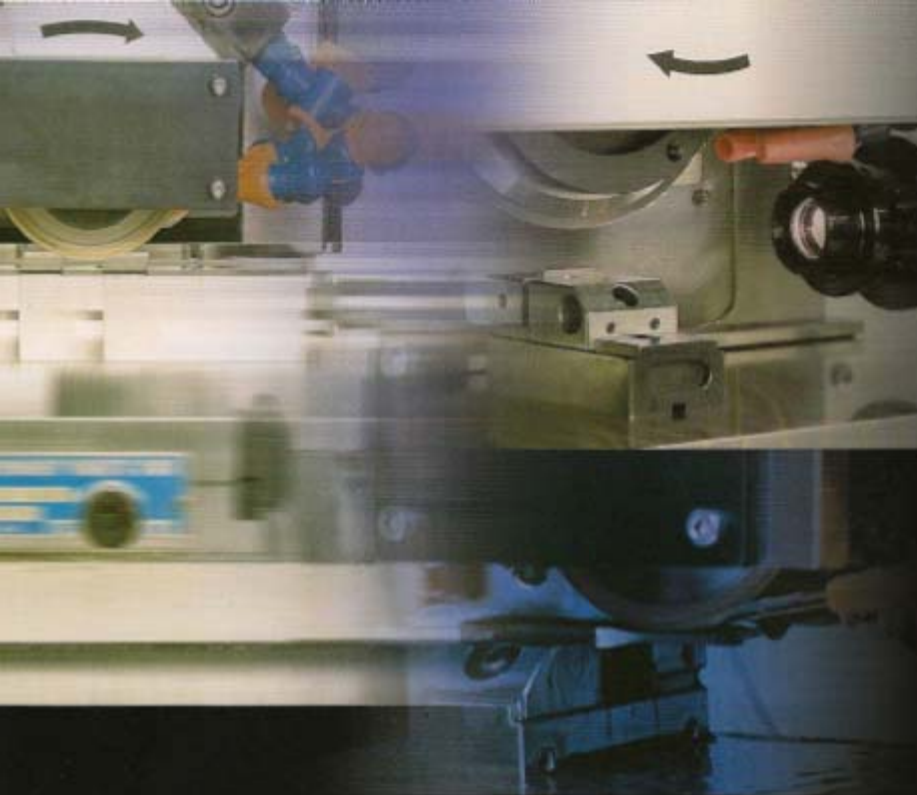
strong point of linear motor drive; high-speed oscillation. Efficient and minute form grinding. No relation for table reverse with infeed (step feed). Continuous feed rate. So table reverse per in feed is minute but feed rate is high. Highly ineffective grinding is high load for in feed and generation of heat, but select this process no problem.

Table 1 reverse per working

	Reverse time (Reverse/min)	1 time in feed μm
UPZ210LiII (Liner motor drive)	350	1.43
HYD servo valve Machine	201	2.5

Condition:
❶ Material: Tungsten carbide
❷ Stock removal: 1mm
❸ Cycle time: 1minut
❹ T-stroke: 20mm

Evolution
Possibility of next...
Ultra precision grinder.

Advantage of Wet Grinding

Low heat resistance, low displacement, uniformity for contact grinding wheel and work pieces. Improve surface roughness, good for small form grinding because of no heat build-up.

Linear motor drive is compatible for small form grinding and no heat build-up

High accuracy of linear straight motion and positioning by table linear motor drive,

High strength and heat resistant structure

■ Development of high strength casting

Linear motor drive has high acceleration and reduced vibration. Vibration is absorbed by new design casting that is 2 times more rigid. It has a smaller footprint but more dense with total weight of 5.7 ton.

■ Heat resistant structure

Adopt 2 times more rigid casting to minimize surface area and adopt full enclosed cover for no effect from outside temperature.
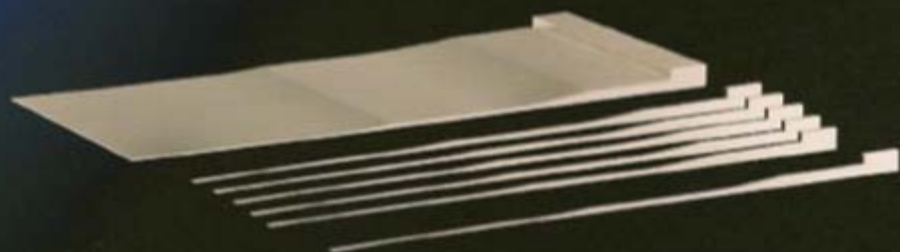
Work piece

Parts name: Step square eject turbine
Material / : SKH51 HRC 59~61

19.0000   R60.0000   R90.0000
0.1250
0.4810
61.5000   1.6000   4.7000   0

UPZ210LiII

Utilizing 3 axis linear motor drive, each axis high accuracy and therefore confidence for minute form grinding.
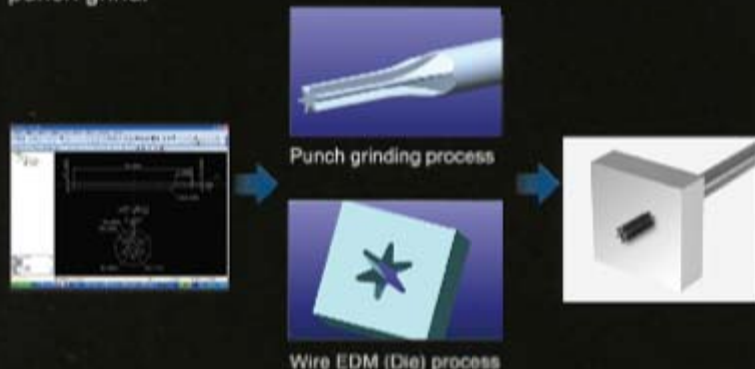
Install CAD data function

Possible easy install machine tools CAD data.

Application

Jointly using wire EDM machine die process CAD data to process punch grind.

Punch grinding process

Wire EDM (Die) process

User friendly and easy conversation software (Easy conversation program)

■ Graphic function

1. Display on G code program. No need cycle start so no more first making and check program.
2. Display graphic for optional magnify display function.

■ Auto Programming function

1. Select start and final point to auto making G code program. Do not need make contouring program.
2. Reduction cycle time, rough grinding plunge and traverse cycle include.

■ Program diagnostic function

Easy mistake protection function through program diagnosis and back ground editing function is standard.

■ Customer G Code program function

1. Memory capacity 30MB.
2. Simple file management. (customize original folder)
3. Estimate cycle time function easy to man-hour control.

Graphic display

G Code contouring display

Equipped with two spindles. Eliminates the need to change grinding wheels when switching from roughing to finish machining.
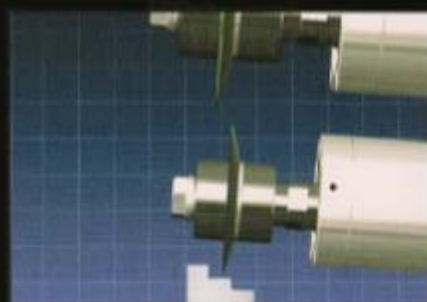
With ATC, truing can be difficult, leading to low-quality machined surfaces. Moreover, the need to observe truing, balancing, and the setting of reference points is inefficient. We recommend that this always be installed.
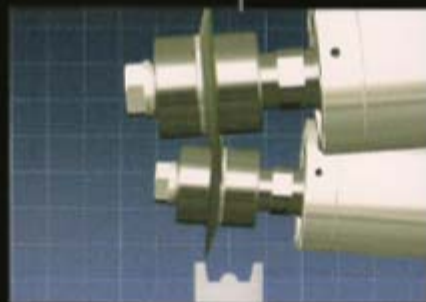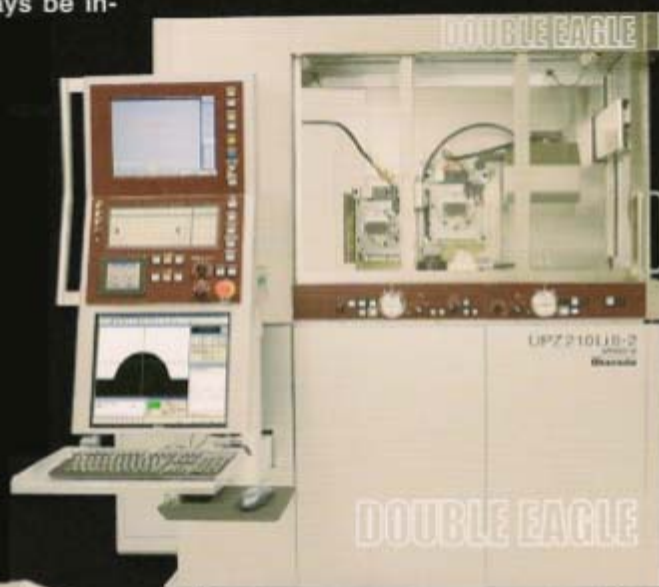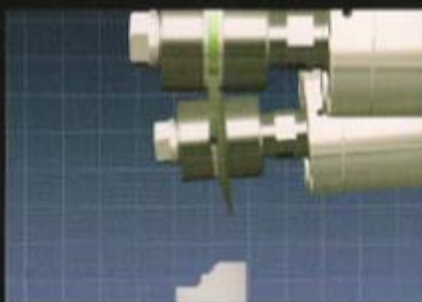
Left and right V-face
Tilt head (±3°) enables machining of both faces.

Rough/finished V-face
The use of different grinding wheels for corner R roughing and finishing enables the production of a sharper corner R.

Flat-faced grinding wheel + V face
By performing a rough traverse as semi-finish machining between the rough shift plunge machining and the finishing traverse, the amount of finish machining can be reduced, and the cycle time shortened.

Using CCD camera and graphics,
You can generate dimension and compensation.

Normal PG machine has 5 um inaccuracy because of screen line, depend on the skill workers confirmation for adjust small tip R. Our new micro profile grinding has now digitized this process, minimizing requirement for skilled labour.

## UPZ form grinder digitizing flow

Correct management Grinding wheel origin position. Grinding start position

Basic distance control by dummy work grinding. Positioning to grinding start point. Set up time 1 min by exclusive grinding jig, positioning accuracy for under 1μm.

Work piece

Dummy block
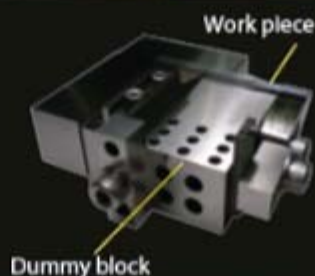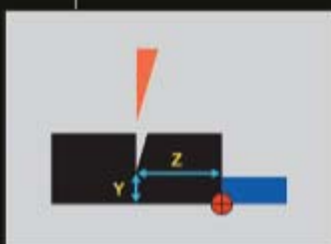
Be visible technological=Graphic processing system on machine

Solution to final measurement minuteness form grinding. Difficult restore setting at take out parts and measurement. Development measurement and graphic processing system on machine.

Air nozzle

Lens

CCD camera
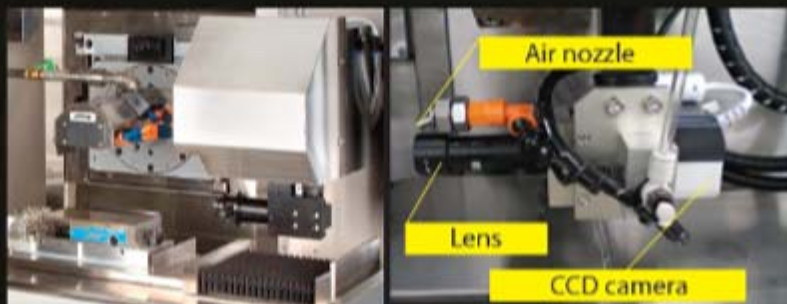
Accurate Grinding wheel form dressing

Accurate Grinding wheel form dressing. Revision wheel tip R dressing, possible recommend 2um level automatic grinding.

Truing by Rectangular Rotary dresser devices
Measure result (Unit:mm)

	Before	After
R form	0.0567	0.0417
Roundness	0.0059	0.0011

Wheel: Metal bond   Dressing time: 62m 06s
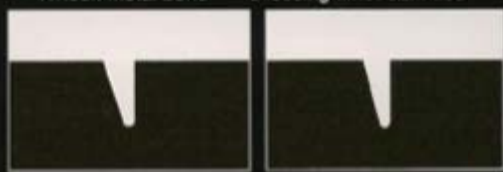
Before dress

After dress

Set up screen at rotary dresser
Easy setting :
Key in form angle and R measure only

GRIND-X Rectangular Rotary dresser devices

Truing by Rectangular Rotary dresser devices

Direct drive rotary dresser can achieve micron level R tip, as this is able to be tangential with the grinding wheel.

UP-CAM

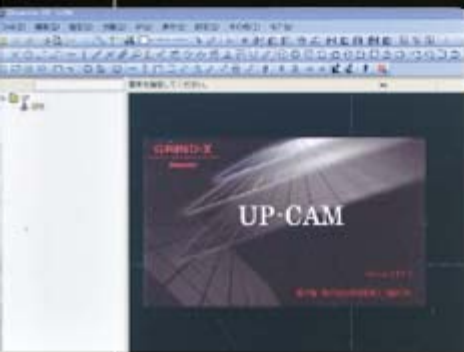## We have a lot of experience of grinding miniature forms on ultra precision mold parts using UP-CAM Auto Grinding Programming Software.

Programming made simple

Install DXF file of work piece and only select grinding start and finish point

1. Shift plunge rough grinding cycle
2. Traverse rough grinding cycle
3. Contouring fine grinding cycle

Start Point & End Point ▶ Auto Grinding Path

Rouging Cycle

Grinding cycle includes Shift plunge, Traverse and fine grinding with contouring.

| Shift plunge | Traverse | Contouring |

Medium fine grinding
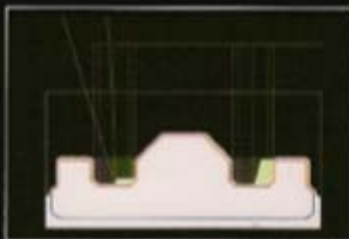
After producing a shift plunge roughing programme, UP-CAM automatically produces a semi-finishing cycle which uses a robust V shaped semi-finishing wheel to quickly remove the remaining stock.

Medium fine grinding

Form dressing revolution (75% quicker by plunge dressing)

Compare form dressing time

High speed dressing made by UP-CAM soft:4M2S Other dressing:18M56S

Wheel — Dress way
UP-CAM soft High speed dressing

Wheel — Dress way
Standard dressing
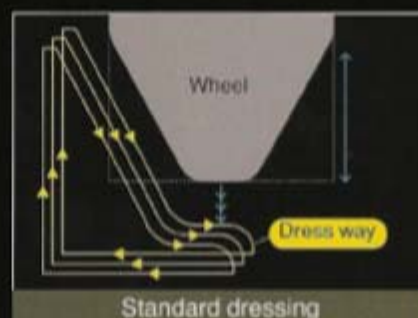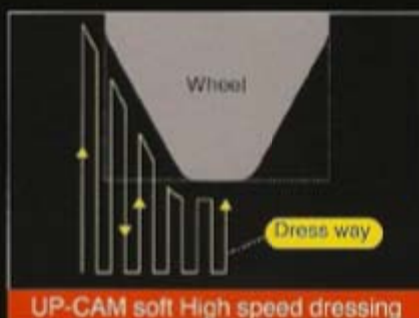
Multiple software

Multiple grinding

Plunge and Traverse combination form grinding, calculation for many type of form to send pattern data.

Step grinding cycle, also 40 pattern combination.

Display next step and during cycle time edit grinding and dressing condition.

Store data and search

Store, search, and edit grinding condition pattern data and all wheel data. Data stored with name, comment, and date.
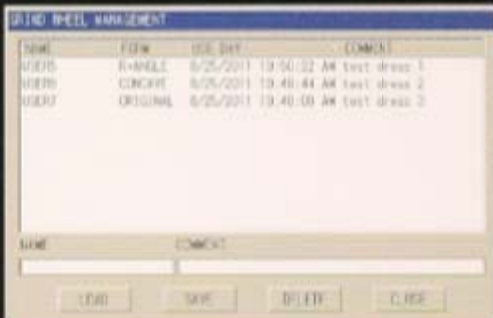
G Code contouring

UP-CAM auto programming software or made by user connected auto cycle.

Change the wheel offset also correspondence, start position compensation and medium fine dressing.

Dressing

8 types of wheel dressing is available through conversation programming.

After replace grinding wheel basic distance auto set up by teaching.

Table set up

Easy function. Punch length control by punch grinding reverse mode.

Tilt grinding view

Tilt head

3 deg grinding spindle similar with profile grinder, grinding used stable wheel tip R for good roughness and forming accuracy. Machine front side has adjustment handle for tilting head.

Small grinding wheel adaptor

Possible to grind punch size R15mm using 30mm wheel. Small R punch is more stronger.

Punch grinding index device

New development of Auto Index Punch Grinding Device. Depending on parts, Index Device can be placed longitudinal or perpendicular and there is no interference during grinding.

GRIND-X Indexing Device

Form Thin slot grinding wheel (Twin rotary dresser device)

Very difficult form under 0.2mm wheel width. But this device advantage is used cup type diamond wheel with offset angle, not touch face touch by point no heat and no damage of diamond wheel. Wheel speed control by inverter. Our experience 0.05 width length 4mm.


Twin Rotary Dresser for thin slot grinding wheel
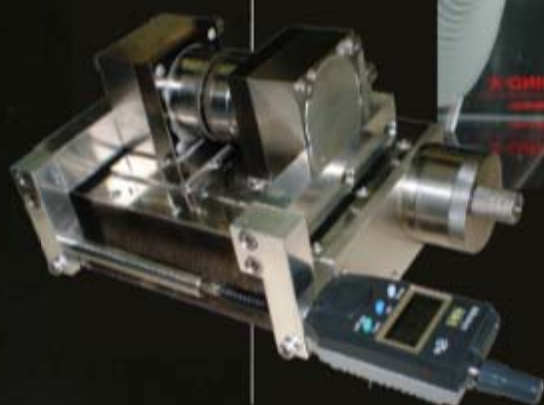
	Item	Unit	UPZ210LI II	UPZ210LI II -2
Capacity	Table work size	mm	200 × 110	200 × 105
	Table travel distance	mm	270 × 120	500 × 120
	Distance from table surface to under wheel	mm	214 (wheel Dia 80mm)	225 (wheel Dia 80mm)
	Chuck size (Length × Width × Height)	mm	175 × 105 × 45	100 × 100 × 45
	Maximum weight of table (Including chuck)	kg	5	5
Table feed (X-axis)	Feed rate	m/min	0.1 ~ 60	0.1 ~ 60
Vertical feed (Y-axis)	Rapid feed	mm/min	1000	1000
	Feed rate	mm/min	1 ~ 1000	1 ~ 1000
	Minimum unit	mm	0.0001	0.0001
Cross feed (Z-axis)	Rapid feed	mm/min	1000	1000
	Feed rate	mm/min	1 ~ 1000	1 ~ 1000
	Minimum unit	mm	0.0001	0.0001
Motor	Grinding wheel	kW	2.2	1.5
	Table feed (Linear Motor)	kW	2.0 × 2	2.0 × 2
	Vertical feed	kW	2.0 × 2 (Linear Motor)	2.0 × 2 × 2 (Linear Motor)
	Cross feed	kW	2.0 (Linear Motor)	2.0 (Linear Motor)
	Coolant pump (Option)	kW	0.06	0.06
	Water chiller (Coolant)	kW	1.6	1.6
	Oil chiller (Linear Table)	kW	1.6	1.6
Power	Electric power	kVA	21	31
Floor space	Length × Width × Height	mm	1700 × 1850 × 1880	1883 × 3384 × 1907
Weight	Estimated machine weight	kg	6000	4600

Machine layout
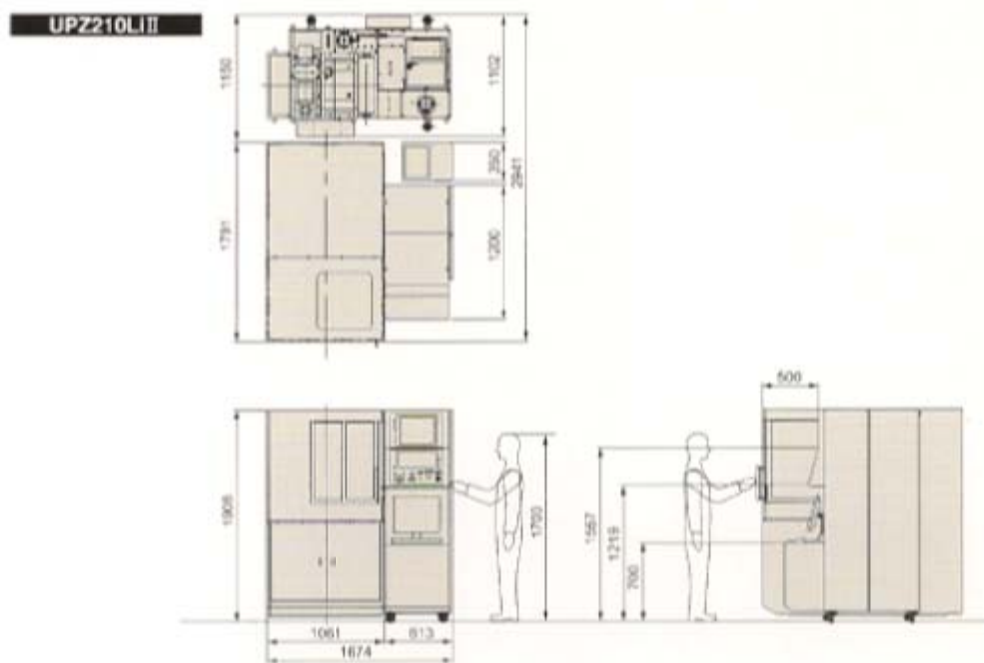
UPZ210LI II

Basic Specifications	UPZ210LiII	UPZ210LiII-2
Standard Accessories		
1. GRIND-X Wheel Ø180mm (For chuck grinding)	○	○ (Ø100mm)
2. Wheel adaptor (IDØ35mm Balance peace type)	○	○
3. Electric permanent chuck 175×105×45mm	○	○ (100×100mm)
4. Chuck back plate	○	○
5. 3 axis full closed loop feedback	○	○
6. Wheel tilt function ±3°	○	○
7. 3 point dresser	○	–
8. Maximum wheel diameter	90/180	100
9. Maximum wheel speed	15000	15000
10. Small wheel adaptor	○	○
11. Large wheel adaptor	○	–
12. Stainless steel cover	○	○
13. Oil chiller unit (Linear Motor and spindle cooling)	○	○
14. Wheel built-in motor	○	○
15. Wheel load meter	○	○
16. Linear guide for table	○	○
17. 15" inch colour LCD touch panel	○	○
18. UP-CAM auto form dressing software	○	○
19. LED light	○	○
20. Tape length 320m	○ (Over 640m)	○ (Over 640m)
21. Enter program 63	○ (Over 125)	○ (Over 125)
22. Custom macro	○	○
23. Tool compensation	○	○
24. Short circuit protection	○	○

UPZ210LiII /UPZ210LiII-2 Standard software

Auto form dressing software UP-CAM
Program capacity 30MB
Function for installing CAD data
Graphic function
Auto programming
Function for rough Plunge & Traverse grinding
Diagnostic program
Back groung edit

Basic Specifications	UPZ210LiⅡ	UPZ210LiⅡ-2	Remark
Options			
1) Chuck Base			
1. Left side back-liner		○	
2. Jig for grinding (Pittato-kun)		○	PT55 (50×50 type) 2 pieces set
3. Jig for grinding (Pittato-kun)		○	PT150 (100×50 type) 1 piece set
4. Sine plate		○	
2) Coolant Tank			
1. Mist collector		○	
2. Magnetic separator		○	
3. Automatic or manual paper filter		○	
4. Cartridge filter		○	
5. Coolant chiller			
• Possible combination		○	
eg) Magnetic separator + Paper filter + Mist collector			
3) Spare Wheel Adaptor			
1. Big size adaptor (ID 31.75mm) balance piece move type	○	–	
2. Big size adaptor (ID 31.75mm) multi balance piece type	○	–	
3. Small size adaptor (ID 24.00 mm) multi balance piece type		○	
4. Medium size adaptor (ID 8.00mm) multi balance piece type		○	High speed spindle (40000 min⁻¹)
5. PFG500 type adaptor (Width 6~16mm)	○	–	
6. PFG500 taper spec.		○	
4) Wheel Balancer			
1. Standard adaptor balancing arbor length 178mm	○	–	
2. PFG500 taper balancing arbor length 178mm	○	–	
3. Precision balancer (Balance weight increase and decrease)		○	
4. Precision balancer (Balance weight increase and decrease and also balance move)		○	
5) Work Light Aperture Light (Waterproof type)			
6) Custom Colour			
7) Oil and Coolant			
1. Static pressure oil 20 Lit	–	–	Shell T32
2. Lubrication oil for wheel bearing and table guide 20 Lit		○	Dafuny mist multi MU32
3. Coolant oil for Tungsten Carbide 20 Lit		○	N-50TC
8) Dresser			
1. 3 point dresser	Standard	–	
2. GRIND-X Orthogonal axis rotary dresser		○	Recondition for V shape wheel
3. GRIND-X Coaxial axis rotary dresser	○	–	
4. GRIND-X twin rotary dresser (Metal diamond 3325 , 2 wheels)	○	–	
5. GRIND-X twin rotary dresser (Metal diamond 3325, 2 wheels) with measuring function	○	–	Minimum measure unit 0.001mm
6. Metal diamond cup wheel (#325) 2 wheels set	○	–	
7. GC wheel (#80) 2 wheels set	○	–	
8. GC wheel (#150) 2 wheels set	○	–	
9. GC wheel (#320) 2 wheels set	○	–	
10. Diamond tool for 3 point dresser (1 CT)	○	–	3point
11. Diamond tool for 3 point dresser (R0.25×40°)	○	–	3point
12. Diamond tool for 3 point dresser (R0.25×60°)	○	–	3point
13. Diamond tool for 3 point dresser (R1.25×40°)	○	–	3point
14. Diamond wheel for Orthogonal axis rotary dresser (Diameter 12mm)		○	High speed spindle (40000 min⁻¹)
15. Diamond wheel for Orthogonal axis rotary dresser (Diameter 20mm)		○	
16. Diamond wheel for Orthogonal axis rotary dresser (Diameter 32mm)		○	
9) NC Function			
1. Tape memory length 640m	Standard		
2. Adding timer and counter (LCD display)	Standard		
3. Signal tower		○	
4. Additional macro variable	Standard		
5. Background light	Standard		
6. Auto shut down function		○	
10) OD Grinding and Index Device			
1. GRIND-X small NC index device		○	Balance weight min. adjust unit 0.0001° 5kg
2. GRIND-X vertical NC index device		○	Balance weight min. adjust unit 0.0001° 20kg
3. Additional NC axis		○	
4. GRIND-X Precision OD grinding device		○	3000 min⁻¹ weight 18kg
5. GRIND-X OD grinding device		○	560 min⁻¹ weight 18kg
11) Other Devices			
1. Graphic digital process system CCD camera, optical auto retract type		○	
2. Graphic digital process system on optical auto retract, measuring and compensation		○	
3. Air dryer		○	RAX3F-PTH
4. High speed spindle (40000 min⁻¹)	○	–	
5. Reflection Source of light		○	
12) Software			
1. Auto form dressing program software			
① Basic software	Standard		
② Installation and training	Standard		
③ 1 set repeat user price (Order 2nd machine)		○	

GRIND-X
AMOTO PRECISION SYSTEMS
Okamoto

⚠ CAUTION