<table>
<thead>
<tr>
<th>Machine Type</th>
<th>Size</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saddle Type</td>
<td>515 ¥ 52 ¥ 53 ¥ 63 ¥ 64 ¥ 75</td>
<td>E1, E2, E2t, PCnc, N</td>
</tr>
<tr>
<td>Column Type</td>
<td>525 ¥ 63 ¥ 64 ¥ 93 ¥ 94 ¥ 95 ¥ 96 ¥ 103 ¥ 104 ¥ 123 ¥ 125 ¥ 126 ¥ 127 ¥ 135 ¥ 154 ¥ 155 ¥ 156 ¥ 158 ¥ 203 ¥ 205 ¥ 206 ¥ 208 ¥ 256 ¥ 304</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>E1, E2, E2t, PCnc, N</td>
</tr>
</tbody>
</table>

**Example**

- SGE-52 BLD2-E2
- N2C-53US4-N

**Slide Way Structure**

- B: Ball bearing
- S: Hydrostatic bearing/Hydrostatic slide way
- L: Direct moving bearing slide way
- D: Dynamic pressure slide way
- A: Air static bearing

**Size (Saddle type)**

- 515 ¥ 52 ¥ 53 ¥ 63 ¥ 64 ¥ 75

**Size (Column type)**

- 525 ¥ 63 ¥ 64 ¥ 93 ¥ 94 ¥ 95 ¥ 96 ¥ 103 ¥ 104 ¥ 123 ¥ 125 ¥ 126 ¥ 127 ¥ 135 ¥ 154 ¥ 155 ¥ 156 ¥ 158 ¥ 203 ¥ 205 ¥ 206 ¥ 208 ¥ 256 ¥ 304

**NAGASE SUG Series**

- ESUG series
- E1000 GC series
- Ultra Precision Forming Surface Grinder N2C E|U series
- Ultra Precision Forming Surface Grinder N2C E|C series
- EHS series
- ESPG series
- ESGE E|C series
- ESPS series
- ENVK-100
- Super Precision Forming Surface Grinder SGC E| series

**Other Machines**

- EG series
- ENSF series
- Super Precision Rotating Forming Surface Grinder
- Super Precision Pressure and Motion Copying Complex Surface Grinder
- PLM series
- ORIGIN series
- EPLM series
- EAP series
- ETR series
- EPIN series
- ENH series
- ELID series
- Grinding assistance CAD/CAM system
- Balancevector 'm'a|3000
- Balancedoctor 'm'a|3000'v

**INFAC**

- INC series
- INTELLIGENT CENTER
- NANO CENTER

**Specifications**

- Please refer to P24 E25 for the specifications.

**Note**

- Machine type
- The numerical value published in this catalogue is a result value.
- It is not a guarantee value.
- OP = Option

**INTELLIGENT CENTER**

- 500 ¥ 200
- 300 ¥ 200

**NANO CENTER**

- 100 ¥ 100
- 100 ¥ 100

**LAPPING・POLISHING MACHINE**

- Super Precision Static Portal Grinder
- Multi Forming Grinder
- Special Purpose Machine

**MOLD POLISHING MACHINE**

- Special Purpose Machine

**BALANCE MEASURING MACHINE**

- Full Auto Balancing System

**MOLD POLISHING MACHINE**

- Special Purpose Machine

**LAPPING・POLISHING MACHINE**

- Super Precision Static Portal Grinder

**INTELLIGENT CENTER**

- 500 ¥ 200
- 300 ¥ 200

**NANO CENTER**

- 100 ¥ 100
- 100 ¥ 100

**LAPPING・POLISHING MACHINE**

- Super Precision Static Portal Grinder
INTELLIGENT CENTER®

Example of form processing:

- Cylindrical minute groove processing (synchronous 3 axes control)
- Circular form processing (synchronous 4 axes control)
- Fresnel form processing (synchronous 2 axes control)
- Milling processing (synchronous 4 axes control)
- Fry cutter (synchronous 2 axes control)

NIC-1408-S5-N series

Machine Size: 300 x 700 x 1408

NC control: N

Axis specification: S5

- Vertical, Cross, Longitudinal, Work pivot rotating
- Axis, single point tool pivot, Hydrostatic slide way

Minimum resolution: 1nm (0.001 µm)

- Example of prism processing
- Example of circle & sin form processing
- Example of 0.4 µm high pyramid form processing
- Example of 100nm step processing
- Example of 10 µm step groove processing

It shows great ability to optical component process of light guide plate, die, spherical surface of axisymmetry and nonaxisymmetry, non spherical lens, reflecting mirror, high precision prism processing etc and microfabrication of free-form surface.
Ultra Precision Forming Surface Grinder N2C-C series

- Machine size: 104 x 125 x 156 x 158
- NC control: N
- Axis Specification:
  - Main axis: Vertical, Cross, Longitudinal: high accuracy hydrostatic slide way
  - Minimum resolution:
    - Regular type: 10nm (0.01 mm)
    - Precision type: 1nm (0.001 mm)

It achieved the resolution of 10nm with 3 axes. Super precision interpolating control enables the high precision non-spherical surface grinding - flat surface grinding and forming, from a workpiece of wide area to a long one.

Ultra Precision Forming Surface Grinder N2C-U series

- Machine size: 52 x 53
- NC control: N
- Slide way structure:
  - Main axis: Hydrostatic bearing
  - Vertical, Cross, Longitudinal: Hydrostatic slide way
  - Minimum resolution:
    - Regular type: 10nm (0.01 mm)
    - Precision type: 1nm (0.001 mm)

It is possible to pursue the processing accuracy close to zero without limit. It achieved 10nm resolution of 3 axes and under 10nm of high accuracy repeatability at the position of processing point. It corresponds to composite process such as wheel process, fixed single point tool process, fry cutter process and polish grinding.
SURFACE GRINDER FORMING GRINDER COLUMN TYPE

SLEC-104-SLS 2-E2
SLEC-154-SLS 2-PCnc
SLEC-156-S 4-PCnc
SLEC-158-S 4-PCnc
SLEC-308-S 4-N

Super Precision Forming Surface Grinder
SLEC series

[Machine Size]
525 63 64 93 94 95 96 103 104 123 125 126 127 135 154 155 156 158 1510 205 206 208 256 304 308 358

[Axis Specification]
SLEC-104-SLS 2-E2 Main axis: Hydrostatic bearing Vertical: Hydrostatic slide way Cross: Direct acting bearing slide way Longitudinal: Precision break-in slide way
SLEC-154-SLS 2-PCnc Main axis: Hydrostatic bearing Vertical: Hydrostatic slide way Cross: Direct acting bearing slide way Longitudinal: Precision break-in slide way
SLEC-156-S 4-PCnc Main axis: Hydrostatic bearing Vertical: Hydrostatic slide way Cross: Direct acting bearing slide way Longitudinal: Precision break-in slide way
SLEC-158-S 4-PCnc Main axis: Hydrostatic bearing Vertical: Hydrostatic slide way Cross: Direct acting bearing slide way Longitudinal: Precision break-in slide way

Various kinds of application! Column type which extends the range of super precision processing of large work pieces including surface fabrication.

It has research and development research and know-how of element technology which maximize features in guide way driving function and meets needs of diverse grinding.
SGU series

Precision forming grinder, discriminates itself by usability and accuracy.

- **Example of mirror processing**
- **Example of form fabrication**
- **0.5 mm step processing**
- **Swivel dresser**
- **Rotary dresser**

- **Machine size**: 52
- **NC control**: E2, E2t, PC
- **Slide way structure**: S4 (main axis), Hydrostatic bearing, Vertical, Cross, Longitudinal
- **Sealing die**

It is a super precision forming surface grinder which adopted the original multiple restraint non-contact hydrostatic slide way for all axes of main, vertical, cross and longitudinal. It has achieved the high accuracy of submicron for the straightness of longitudinal table, the spotting accuracy of vertical, cross axis and the turning accuracy of main axis.

- **EPG series**
- **Machine size**: 52, 63, 64
- **NC control**: E2, E2t, PC
- **Slide way structure**: SLD 2 (main axis), Hydrostatic bearing, Vertical axis, Direct-acting bearing slide way, Cross, Longitudinal axis, High accuracy break-in slide way

It is a mixed structured machine with the grinding know-how of precision mold maker's and the production know-how of NAGASE's precision grinder. It is a compound slide structured machine with the adoption of those which non-contact hydrostatic slide way for the wheel spindle, original high linear system for the vertical axis, and the slide way of carefully scrapered dynamic pressure for cross and longitudinal axis.

Configuration accuracy of submicron & surface roughness of nanometer.
SURFACE GRINDER & FORMING GRINDER
SADDLE TYPE

- Example of mountain shape fabrication
- Example of mirror processing
- Example of form fabrication

- Mirror processing
- Machine size: 515 x 520 x 52 x 63 x 64
- NC control: E1, E2, E2t, PCnc
- Slide way structure: BLD2 (Main axis: Ball bearing, Vertical axis: Direct-acting bearing slide way, Cross axis: Longitudinal axis: Break-in slide way)

@Options
- DLD2 (Main axis: Dynamic pressure metal bearing)
- SLD2 (Main axis: Hydrostatic bearing)

It achieved the twice as high rigidity as former types comparison with Nagase's machine of same size by the high rigid mono cock body and the column with the width of max of its class. It adopted the direct-acting ball bearing which has a high rigidity and low friction for the vertical slide way. It is able to follow-up an order of 0.1 micron. And also, this machine has achieved the extremely low vibration by the original vibration analysis and development design. It is a machine of high accuracy which makes a good use of cutting in of submicron.

SGE -64-BLD 2-E2
SGE -515-BLD2-E2t
SGE -520-BLD2-PCnc

Compact grinder with high rigidity and high accuracy.

Standard forming surface grinder SGE series
**SURFACE GRINDER - FORMING GRINDERS - SADDLE TYPE**

- **Machine size**: SGW: 52, 63, 64, 75
- **NC control**: N
- **Slide way structure**:
  - Main axis: Ball bearing
  - Vertical axis: Direct-acting bearing slide way
  - Cross, Longitudinal axis: Break-in slide way

**Options**
- DLD2: Main axis - Dynamic pressure metal bearing
- SLD2: Main axis - Hydrostatic bearing

It is a general-purpose grinder of next generation which makes a step to automation with keeping a handling-easiness of general-purpose grinder. It can cut incertainly after the order of 1\(\text{m}\) by adopting the high linear system for its vertical wheel axis. It has a high accuracy of automatic constant-dimension surface grinding. It has put the functions of regular use together on the saddle.

First step from general-purpose machine to NC machine, start with this machine!

**SGK series**
- Standard general-purpose surface grinder
- SADDLE TYPE

Here is the superiority of SGW to general grinding machine SGK!

- SGK: 1-axis NC positioning
  - Incision resolution and incision accuracy are stable.
- SGW/M: Manual positioning
  - Operation board which is applied usability of general-purpose machine.

There is difference between SGK series and SGW/M series. That is the difference of rigidity. Enlarge the size of main body and column and improve the rigidity more than former machine.

It is a grinder which has full of functions on a compact body.

This saddle type grinder is easy to use and known as wide range of the processing. Since, all of operation parts are in front, it is possible to operate efficiency in the fixed position while setting automatically as well as operating manually.
High accuracy, high efficiency and high speed reciprocating processor which differs in processing accuracy and surface roughness. We also suggest the machine with innovative on-the-machine dresser.

SHS series

- Rotary dresser (SHSD-80) PAT.P
- Swivel dresser (SHSD-80) PAT.P
- Truing¥dressing of metal bond wheel

- Process example of form fabrication
- Example of punch processing
- Example of contouring profiling

SHSD-80-BL 2S-PCnc

Correspond to on-the-machine dress
OP

HIGH RECIPROCATING TABLE FORMING GRINDER

- Machine size: 80/15
- NC control: N-PCnc only for SHSD-80
- Axis specification: BL2 (Main axis) Ball bearing (Vertical, Cross, Longitudinal axis) Direct acting (bearing slide way)
- Option specification: BL2S (Longitudinal axis) Hydrostatic axis slide way only for 80/15
- AL3 (Main axis) Air static bearing

This is the machine of which developed for high speed profile fabrication and micro grooving for small work pieces. It has high reciprocating table and high speed revolution precision spindle that has a built-in precision high frequency motor. The spindle head can be declined up and down within }5."
**HIGH EFFICIENCY SLICER**

- **Machine size:** 150-200-315
- **NC control:** N
- **Axis specification:** BL3
  - **Main axis:** Ball bearing
  - **Vertical, Cross, Longitudinal axis:** Direct acting bearing
- **Option specification:** AL3
  - **Main axis:** Air static bearing

This is a high rigid slicer which can do the 'one-pass, full-cut' of deep groove. It is an optimum machine for high efficiency and high accuracy cutting and grooving of optical glass, ceramics, crystals, membrane head and etc..

**HIGH EFFICIENCY AUTOMATIC CYCLE SLICER**

- **Machine size:** 52-525
- **NC control:** E2
- **Axis specification:** BL3
  - **Main axis:** Ball bearing
  - **Vertical, Cross, Longitudinal axis:** Direct acting bearing

This is a reasonable machine that made it possible to do the slicing process with easy operation.

**Example of crystal cutting**

**Example of prism cutting**

High efficiency slicer which is available for wide range of use from one pass full cut of thick work piece to minute grooving. Easily operated slicer.
Precision grinder that changes processing environment.

**SHT series**
- Machine size: 415
- NC control: PCnc
- Axis specification: BL, Main axis: Ball bearing, Vertical, Cross, Longitudinal axis: Direct-acting bearing slide way

The grinding style is compact size NC grinder, totally-enclosed cover method and possible to set up in the assembly line.

**SPS series**
- Machine size: 150
- NC control: N

Adapt NAGASE’s original hydrostatic structure slide way function. It is a super precision machine which decreases vibration drastically and aim at high accuracy processing.

Chip wafer by full automation after scribing.

**NVK-100**
- Machine size: 100
- NC control: N

This breaking machine enables to chip wafer such as crystal, glass and ceramic etc which is scribed for chipping beforehand by full automation.
Realize high accuracy processing by vertical and horizontal index in high accuracy index resolution.

1. Indexing resolution 1/10000*
2. High accuracy resolution ±0.5 seconds
   (OP : Ultra high accuracy resolution ±0.3 seconds)
3. Continuous revolution 10min⁻¹ (OP : 200min⁻¹)*
4. High accuracy synchronized operation follow-up type
5. Vertical • Horizontal types
   * Revolve continuously without index function.

Measurement by Auto-collimator

※ This data is a measurement result of high accuracy resolution index table.
Available for precision gear grinding. Possible to have DIN 2 class and below accuracy.

**SUG series**
- Machine size: 300
- NC control: 5 axes control
- Axis specification: (Vertical, Cross, Longitudinal) : Direct acting bearing
- Index: Hydrostatic slide way
- Swing shaft: Dynamic pressure
- Option: Main axis: hydrostatic

Precision tooth form grinding of helical gear etc. within ±45° can be done by the 5 axes control of vertical, cross, swivel table and non back shaft index. It also is able to do the forming grinding which needs a precision indexing.

**Process example**

Available for large aperture precision helical gear grinding.

**1000 GC series**
- Machine size: 158
- NC control: 5 axes control
- Axis specification: 5
  - Vertical, Cross, Longitudinal
- Hydrostatic slide way
- Wheel axis, Indexing axis, Swing shaft
- Hydrostatic bearing

Large aperture precision helical gear grinder which is available for φ 1000mm of maximum external diameter of work piece.
Kaleidoscopic changes! Multi grinder which processes from right angle grinding to fabrication of grooves and steps by one chucking.

Super precision longitudinal axis rotary processing to increase working efficiency.

- Single point tool processing
- Automatic measuring device
- Inner and outer diameter grinding process by vertical head

This grinder is able to do the high accuracy automatic grinding process of surface forming, grooving, and cutting as a high performance multi grinder. It does 5 faces right angle grinding at one chucking. It is also able to achieve the high accuracy right angle grinding process by using the high accuracy index which is an optional equipment.

- Machine size: 500 × 600 × 800
- NC control: N
- Axis specification:
  - Main axis: Hydrostatic bearing, vertical axis: Direct bearing, longitudinal axis: Hydrostatic slide way, rotating table: Hydrostatic bearing

Minimum resolution: 100 nm (0.1 µm) 10 nm (0.01 µm)

Non-contact hydrostatic bearing for its rotary table, and get the flatness and surface roughness of far superior to others.

Possible to grind by exchanging grinding wheel to single point tool and internal grinding by loading vertical head.

Correspond to 10 nm of minimum resolution.

**SGT-315R**

**RG series**

- Machine size: 315 × 315 R
- NC control: N
- Axis specification:
  - Main axis: Ball bearing, vertical × cross axis: Direct acting bearing, longitudinal axis: Hydrostatic slide way

CD die Processing

Polishing head loading type

- **SGT-315RPA**
SUPER PRECISION ORESSURE AND MOTION COPYING COMPLEX CONTROL SURFACE GRINDER

**σσσ series**

- Pressure copying mirror grinding of 150mm Zirconia
- Processing of 40-μ' crystal thickness
- Processing of 10-μ crystal thickness
- High efficiency processing of 190silica glass.
- Processing of 150 soda glass with 54-μ thickness

**NSF series**

- NSF-350
- NSF-600
- NSF-14

Nanosurf® High quality and efficiency machine which utilized the characteristics of super precision machine.

**PLM series**

- PLM-610
- NLPM-1750
- Loading 1750 of surface platen

LAPPING & POLISHING MACHINE

This grinder enables to process high efficiency grinding and mirror grinding in a short time by the unique method of pressure copying process with fixed abrasive.

The super non contact hydrostatic guide way is adopted for the wheel spindle axis, work axis and pressure copying axis. The processing damage given to work piece becomes less than former processing method.

It enables from lapping process to polishing process only by exchanging fixed grinding wheel.

Also, it is able to process with cyclic soluble grinding fluid.

- Machine size: 350 x 600
- NC Control: N
- Slide way structure: Wheel axis work axis = Hydrostatic bearing

This is a lapping & polishing machine which has adopted the super precision non contact hydrostatic guide way for a rotating platen shaft. It achieved the platen surface accuracy of less than 1-μ after the facing process, by the low vibration rotating shaft which has no irregular movement. The process damage given to a thin work piece is extremely small as the little vibration influences its work piece during the process.

It is high efficiency lapping machine which has low angle sagging when processing strip work pieces.

Possible to use 'P-μ' 0.5-μ of diamond abrasive grain on kemet copper platen.

- Machine size: 610 x 1400
- NC control: N
- Axis specification: Lapping machine
- Hydrostatic bearing Facing device iOPj

Available for ultrathin processing by miniaturization of super flatness processing and affected layer by fixed abrasive.
Super precision portal grinder which shows greatest ability at high accuracy process of long and large work pieces

**ORIGIN series**

- Machine size: 4025, 6025, 10025
- NC control: -N
- Axis specification: SLS
- Main axis: Hydrostatic bearing
- Vertical axis: Direct acting bearing slide way
- Longitudinal axis: Cross rail vertical axis × cross rail longitudinal axis: Hydrostatic slide way

This is super precision portal grinder which can secure the highest accuracy by combination of Nakase’s original component grinding units. It has non contact slide way structure and can secure accuracy without frictional wear. Work pieces of high weight can be processed in high accuracy with suppressing twist and creep. It also correspond to high accuracy single work piece of large parts and high accuracy base level grinding promptly.

It shortens the processing time and has the unique function of super mirror grinding and high accuracy surface grinding. Realize 2 μm/4m of performance on high accuracy axis system and base level grinding of machine tool.

- 16 points grinding (1.8 μm/10 × 2.5m)
- Flatness 0.8 μm / Example of 02m processing

**Actual achievement of flatness processing**

<table>
<thead>
<tr>
<th>Flatness</th>
<th>Union Jack isometric drawing</th>
<th>Measuring device</th>
<th>Date</th>
<th>Length of base</th>
<th>Closing error HF</th>
<th>Closing error EG</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.85 μm/1400 × 860mm</td>
<td>Nakase Interex Co., Ltd.</td>
<td>Talybell</td>
<td>02/14/2004</td>
<td>(AB, HF, DC)</td>
<td>0.04 μm</td>
<td>0.06 μm</td>
</tr>
</tbody>
</table>

Taylor Hobson analysis software VER3.00
Special processing machines that specialize in multi and compound processing which meet customer’s needs are gathered.

**MULTI FORMING GRINDER**

**SGC-205-S5-N**

Super precision index table, internal gear grinding device, external gear grinding device, magnetic chuck for surface grinding, spin table for internal and external processing are loaded on super precision grinder.

This is a special machine with multifunction which enables research and development.

Index accuracy ± 0.2 seconds
Roundness of rotational accuracy 0.2 μm
Flatness 0.8 μm / 600 ~ 400 μm
Accuracy for thickness ± 0.1 μm

Available for mirror grinding and various micro fabrication processing for 10 nano feed back by diamond single point tool unit attachment. Also it corresponds to your company’s lab processing which pursue accuracy of the next generation as well as high accuracy and efficiency of current work piece.

**Processing content**

- Surface grinding
- Form processing of grinding wheel
- Internal and external gear grinding
- Index processing
- Rotary processing
- Grinding and cutting of internal surface
- Grinding and cutting of external diameter
- Micro fabrication groove cutting

**Machine size**

- 205

**NC control**

- N5

**Axis specification**

- S5

- Main axis: Hydrostatic bearing
- Vertical Cross, Longitudinal axis: Hydrostatic slide way
- Revolution table: Hydrostatic bearing

**SGC-104**

Super precision index table with gradient function which is made by Nagase' original machine is installed.

Max. gradient 3 degree (Option: Max. gradient 5 degrees).

Also, rotary dresser and swivel dresser are loaded and enable form grinding which is necessary in the process of die manufacturing process of thread rolling dies and pulling form flat dies on this one machine without setup and switching.

Enable continuous and unmanned machining process. Precision grinding which used to be done only by the skilled engineer, but automatic control makes it possible to do it. The high efficiency of each feature’s repeatability made it possible these kinds of automatic grinding in machine processing point.

**Process content**

- Surface grinding
- Index processing
- Form processing of grinding wheel
- Profiling processing
- Mirror grinding
- ‘R dimensions form grinding

**Machine size**

- 104

**NC control**

- N6

**Axis specification**

- SL3

- Main axis: Hydrostatic bearing
- Vertical axis: Direct acting bearing
- Cross axis: Longitudinal axis: Hydrostatic slide way
- Index table: Hydrostatic bearing

**Table area**
MULTI FORM GRINDER…A

FP-2010

FP-0806

FP-series

¡3 axes pattern teaching which polishes even the complicated form easily.

N2C-400C-AS3-N

RG-2000-S4-N

SGT-315RPA

MOLD POLISHING MACHINE

Machine size: 0806 1510 2010 2513
NC control: N

This polishing machine has adopted a constant pressure grinding method of NAGASE's original self modeling mechanism. It is able to polish the complicated free-form surface of a mold with high efficiency by only an easy teaching operation.

There are 2 types of column type and portal type. It is able to polish the material like glass and ceramics.

Reach the top of polishing from die to glass¥ceramics.

It is 6 axes CNC grinding processor which has index function, main axis revolution function, dress radiation function in addition to X-Y-Z, 3 axes of super precision grinder. It is a special machine which has grinding, cutting, automatic measuring functions.

It is possible to process free form processing such as deeply engraved non spherical lens form if oblique axis is loaded and achieved ±0.2µm of form processing accuracy in grinding. Furthermore, Rennieshaw's touch prove is set on automatic meter reading and it has the function which can measure ±0.2µm of form accuracy.

It is super precision processor that satisfies wide range of needs such as automatic form creation dress function and mirror grinding with minute abrasive. The control system secures positional repeatability by 10nm control.

Processing content
- Non spherical lens processing
- Non spherical polishing process
- Free-form surface grinding
- Grinding for dies and rolling dies

It is high performance super-jumbo rotary form grinder which is able to process from axial symmetry non spherical processing to high accuracy surface grinding.

This follow-up type grinder can achieve high accuracy that is never gained by large size grinder before.

The maximum diameter of work piece is 2m and minimum revolution is 10nm control.

This super-jumbo rotary form grinder enables to grind non spherical lens of axial symmetry and high accuracy grinding of large parts. It also can process parallel accuracy of large parts with ±1µm. It changes your processing contents!

Processing content
- Rotary process
- Shim process
- Non spherical grinding of axial symmetry
- High accuracy polishing process
- Function process as large type super precision lathe
- Frenel cutting function

Option

Machine size: 2000
NC control: N
Axis specification: S4
Main axis: Hydrostatic bearing
Vertical axis: Longitudinal axis: Hydrostatic break-in slide way
Revolution table: Hydrostatic break-in slide way
SPECIAL PURPOSE MACHINE

- Form grinder with wire discharge forming dress
- Continuous automatic grinder with blade 
  "Thomson blade, doctor etc." 
- Kariba roller grinder
- Electrolytic grinding
- Worm grinder
- Full automatic grinder of Locker Arm
- Broach grinder
- Grinder with round blade
  Continuous automatic grinder with perforated line blade
  "Full automatic operation of hoop material"
- Grinder with special blade
- Spline grinder
- High speed cylindrical grinder
- Line up of Nagase's original special-purpose machine
7 sorts of NVAC commodity excellent in dressing and sharpness, brilliant at creation of blade appropriate for grinding, able to sustain grinding wheel form and quiet, and adaptable to changes of grinding conditions and very versatile.

### Types

<table>
<thead>
<tr>
<th>Size</th>
<th>Abrasive grain</th>
<th>Grade</th>
<th>Bond</th>
<th>Grain size</th>
<th>Circumferential speed MAX</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
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### Features

1. Excellent especially for glass and chromium steel

### Super Abrasive Coating Wheel NRX-GS

WAP60E is a grinding wheel with uniformly dispersed pores which are bigger than abrasive-grain diameter used. Wide intervals between abrasive grains and excellent holding power of the grains contribute the high performance of grinding with good dressing ability and less clogging. Especially it has a beneficial effect on precision grinding which dislikes occurrence of grinding burn. This grinding wheel can adapt to any kind of precision grinding use such as for hardened or special steel.

### Super abrasive coating grinding wheel supporting various machining! NRX-GS

Try NRX-GS with those features above!

<table>
<thead>
<tr>
<th></th>
<th>For super precision mirror grinding, less grinding resistance and good grindability compared to conventional products</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Great performance on heavy duty grinding (creep) machining #170 to 200! 2 to 2.5 times as conventional products!</td>
</tr>
<tr>
<td></td>
<td>Especially powerful for ceramics and quartz glass! For heavy duty grinding, 3 times as conventional products! For mirror grinding, grindability is excellent.</td>
</tr>
<tr>
<td></td>
<td>Less scratches on machined surface by mirror machining</td>
</tr>
<tr>
<td></td>
<td>Extremely less abrasion than conventional products by form shaping machining (including contour grinding) while sharpness is double!</td>
</tr>
</tbody>
</table>

### NVAC Grinding Wheel

New Lineup of NVAC WAP Grinding Wheels!

<table>
<thead>
<tr>
<th></th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WAP60E nanovac</td>
</tr>
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</table>

For grinding and dressing, WAP60E nanovac is a grinding wheel with uniformly dispersed pores which are bigger than abrasive-grain diameter used. Wide intervals between abrasive grains and excellent holding power of the grains contribute the high performance of grinding with good dressing ability and less clogging. Especially it has a beneficial effect on precision grinding which dislikes occurrence of grinding burn. This grinding wheel can adapt to any kind of precision grinding use such as for hardened or special steel.

Try NRX-GS with those features above!
Truing Dressing System

NV-125P

This is a high stiffness and heavy duty high efficiency vertical rotary dresser. It is great for truing and dressing of wheels as metal bond etc. which is hard to be dressed.

Manual tentering dresser
Double cup truing device

NGSR-20

It has got double cup type grinding wheel, and is able to do high efficiency and high accuracy truing and dressing. Truing and dressing stroke has an important meaning to get the most out of the characteristics of grinding wheel. We have prepared various kinds of truing and dressing tools for users to make the best use of all kinds of nanovac wheels. Not only rotary dressers as below but we also have other various kinds.

Make the width of the grinding wheel by manual. It is able to make 0.08mm width.

| Jig for grinding of strain free |
| Pin support jig HTZ series |
| For precision grinding |
| Grinding sound detector |
| Precision level block |
| Grinding wheel rack |

Manual tentering dresser
W cup truing

NV-125P
Active vibration-isolation system

Epoch-making vibration-isolation system enables super-quality.

Features
- Vibration transmission characteristic and response characteristic can be changed freely.
- Improvement of excessive response enables to suppress vibration.
- Reduction of transmission of floor vibration from low frequency.
- Some frequency band width can be restrained.

Vibration problems
There are two types of disturbance with different actions as the above. It is important to treat the disturbance separately to handle micro-vibration!

Built in active type
Suspended active type

Air and temperature distribution analysis
The necessity of nanoenvironment
For ultra precision process, not only machine but also the environment is needed to be controlled in high accuracy. As for those process which needs the accuracy of nano meter order, only a small change of surrounding air affects its process accuracy. Thus, not only the temperature control for whole factory but also to supply the precision temperature controlled air to the limited space that fences the processor in is needed.

Super Precision Temperature Controller  nanoenvironment

Vibration-Isolation System to Support super precision Machining  nanostabilizer

Next-generation active-control vibration-isolation table
NAGASE proposes total vibration-isolation system to support super precision machining.

Examples of effectiveness of vibration-isolation table
Vibration isolation performance  Vibration control performance  Transmission characteristics

Only air conditioner is used

"south"  "north"
### BALANCE MEASURING MACHINE  
**Balancevector** NB-3000

#### Features
- Ambalance correction by liquid
- Compressed air drive
- Maintenance free frange
- Learning function
- Remote control
- Auto/Full auto/Machine side order
- Compact control box
- Automatic parameter set-up
- Strong enough to cope with disturbance
- Non-contact balance correcting method
- Easy control of liquid injection quantity

#### Specifications
- **Vibration measurement revolution range**
  - Under 100,000 REV. 1min⁻¹
  - Over 100,000 REV. 10min⁻¹
- **Imbalance correcting quantity**
  - 6.08 × 10⁻⁵ ~ 49μm/s²
- **Revolution measurement range**
  - Depends on equipped frange diameter
  - Depends on users' spec. 300 ~ 300,000min⁻¹
- **Measured resolution** (revolution)
- **Vibration sensor**
- **Revolution sensor**
- **Power supply voltage**
- **Power consumption**
- **Operating temperature limit**

### FULL AUTO BALANCING SYSTEM  
**Balancedoctor** NB-3000W

#### Features
- Inprocess measurement
- Total measurement
- Visual Display
- Automatic revolution follow-up / Automatic measurement
- Alarm output function
- Able to display 2 ways of revolution
- Able to display 5 ways of imbalance quantity
- Constant display of revolution
- Digital display of imbalance position
- Interrupting wave detection
- Able to memorize parameter values of multiple machines

#### Specifications
- **Vibration measurement revolution range**
  - Depends on equipped frange diameter
  - Under 100,000 REV. 1min⁻¹
  - Over 100,000 REV. 10min⁻¹
- **Imbalance correcting quantity**
  - 6.08 × 10⁻⁵ ~ 49μm/s²
- **Revolution measurement range**
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- **Measured resolution** (revolution)
- **Vibration sensor**
- **Revolution sensor**
- **Power supply voltage**
- **Power consumption**
- **Operating temperature limit**

---

**Precision vice for precision grinding NV series**

- **Punchdex**
- **V block**
- **Permanent magnetic micro pitch chuck**

- **Indexing device for precision grinding**
- **For precision grinding**
- **For precision grinding and electric discharge machining**

- **Double-ended dresser**
- **90° angle dresser**
- **Sine vice**
- **Indexing device for precision grinding**

---

**Dexice**

These are vital tools of process measurement, etc. for precision grinding such as a precision vice, block, measurement stand, right angle measuring.

- **Accuracy**
  - Parallelism: within 0.002mm
  - Angularity: within 0.002mm
Principle of ELID grinding

Principle of ELID grinding

View of installation of ELID device

Process example of ELID

Mirror grinding of low-expansion glass

Applications for surface grinder

Features

- CAD/CAM on PC for super precision forming grinding
  
  - Easy and automatic building of program for complex grinding-wheel forming and contouring grinding

Requirements for ELID (Electrolytic In-process Dressing) machining is a system developed based on technical assistance by RIKEN The Institute of Physical and Chemical Research.

Grinding assistance CAD/CAM system

- Features

  - nano

  - SGU-52-S 4-PCnc

  - Windows95/98NT4.0

  - Pentium200MHz or better

  - 64MB MIN.

  - 50MB

  - Resolution 1024X768

  - Mouse

  - EOS

  - ECPU

  - EMemory

  - EDisk space

  - EDisplay

  - Other

  - Windows2000/XP

  - Pentium4 or better

  - 512MB MIN.

  - 50MB

  - Resolution 1024X768

  - Mouse

Grinding system for ELID Electrolytic In-process Dressing grinding

Challenge to super flat surface machining! Optimum machine structure to maximize the characteristics of ELID grinding.

This system enables development of optimum machine structure depending on the purpose of ELID grinding.

NAGASE has not only supplied necessary sources and devices such as special grinding wheels and power for ELID grinding but also provided test grinding, preparing for response to customer's request with long-established grinding technique.

Cp4

光学超精密加工 CAD/CAM 系統

- Composing a program for super precision machining for optical system

This system supports axisymmetric machining, free-form surface machining and light guide plate machining.

The above three types can be combined freely depending on customer's request.

- Example CAD/CAM system for N1C axisymmetry free-form surface light guide plate

- CAD/CAM system for N2C Free-form surface

- CAD/CAM system for N3C Light guide plate

Cp

Die-casting CAD/CAM system

- Features

  - Optical super precision machining CAD/CAM system

  - Composing a program for super precision machining for optical system

  - This system supports axisymmetric machining, free-form surface machining and light guide plate machining.

  - The above three types can be combined freely depending on customer's request.

  - Example CAD/CAM system for NIC axisymmetry free-form surface light guide plate

  - CAD/CAM system for N2C Free-form surface

  - CAD/CAM system for N3C Light guide plate

- Other
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Note: The table contains specifications for various machine types, including size, vertical unit, cross unit, and power output. The values are detailed in millimeters and watts.
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