

1 PRODUCT DESIGNATION

Formal name : Automatic Cutting Saw
Model number : DAC552

2 OUTLINE

DAC552 cuts brittle materials such as magnetic heads for VTR, FDD and HDD using a thin blade with a small diameter through high-speed rotation of a super precision air spindle of DC brushless motor built-in type.

3 FEATURES

This machine has inherited the strengths of its DISCO predecessors, and has the following features.

1) Main body

Compactness of the machine has been realized without damaging the cutting stroke. Thanks to the adoption of an unique base which only bears the load of the X-, Y-, and Z-axes, the design has greatly improved rigidity and achieved a constant stable accuracy without any influence from excessive load. In addition, the material of the base has been changed from conventional cast to stone to have the design further improved stability of accuracy.

2) X-axis

The stone air guide system has been employed for the slider section. Thanks to semi-closed loop control using an AC servo motor with a ball screw, smooth feed and reliable positioning are possible. In addition, using the same stone of the base, the design improves the stability of accuracy in temperature changes. Due to the design suitable for the air guide, rigidity has improved.

3) Y-axis

A ball screw drive system using a high accuracy linear guide has been employed for the slider section.

In addition, due to the adoption of an AC servo motor and unique fully closed loop control system with a 0.1 μm laser scale, super high accuracy and high-speed positioning are possible.

4) Z-axis

Thanks to the adoption of the high-efficiency pulse motor and motor driver, in addition to the swing mechanism, short cycle time has been realized.

The minimum resolution is 0.1 μm so that the repeat accuracy has been improved.

5) Main axis

A 1500W DC brushless motor built-in type air spindle is employed. The design copes with the wiring of a flange cover switch (special product) and blade breakage detector (special accessory) in consideration of safety countermeasures.

6) Work table section

Thanks to an easily exchangeable configuration, it is possible to cope with various workpieces and jigs. For handling thick workpiece, a θ -axis spacer unit is available as a special accessory with consideration of easily exchangeable workpiece.

7) Microscope

A microscope with a focal distance of 25 mm is attached as standard equipment and has been designed with improved resolution in consideration of thick workpieces. The CCD camera is available as special accessory.

8) Operation section

This section consists of a 9 inch monitor and an operation panel. They are located for the easiest operator usage.

The operation panel uses easy-to-see color coordination and key arrangement as well as a short stroke click switch so that operation procedures are understandable and it is easy to avoid a wrong operation.

In order to improve the ease of workpiece demounting, the slide can be moved approx. 87 mm from the operation panel.

9) Control section

This section has a configuration where it can be stored as a completely independent unit from the mechanism main body. Thanks to the installation of a 16-bit MPU, processing capability has been greatly improved. It is possible to enter 30 types of user program as well as to conduct serial communication (a product based on the RS-232C). This section has been designed with full consideration of safety and maintenance of the individual sections. Especially for safety, a design satisfying the CE marking is standard and it can be modified to satisfy SEMI-S2-93.

For downloading and uploading of the cut data, a 3.5 inch floppy disk driver is provided as a special accessory.

10) Waterproof cover and slide cover section

The safety specification for this is based on CE markings. The waterproof cover section is equipped with the lock mechanism and the up/down folding-type open/close system improving the maintenance workability.

The slide cover section is completely surrounded by the cover in order to prevent splashing during the cutting operation. In addition, under the safety specification, the cover open/close status is monitored by the sensor.

11) Others

- a) Optical fiber lighting equipment is installed as standard equipment.
In addition, a knob for light intensity on the operation section makes adjustment easier.
- b) Thanks to the attachment of a dust filter, cleaning becomes much easier.
- c) Individual instruments are arranged at the front and side of the machine in order to improve machine status recognition.
- d) The water-sink type double bellows are attached to the X-axis section and waterproof plate and subcase are installed to the spindle in/out section as standard to improve the sealing design. Removal of the X-axis bellows becomes easier compared with the conventional design.
- e) Securing the main body cover incorporates the safety of tool access and has the design to easily attach and detach.

4 BASIC STRUCTURE

- 1) Cutting section
- 2) Spindle section
- 3) Blade section
- 4) Microscope section
- 5) Operation panel and CRT display section

5 BASIC SPECIFICATIONS

5-1. Cutting Section

- 1) Available wafer cutting size
220 W x 160 D x 25 mm H
- 2) X-axis (chuck table horizontal movement)

Effective cutting stroke	220 mm maximum
Cutting range	Circle: 0.001 - 160.000 mm Square: 0.001 - 220.000 mm
Minimum step	0.2 μ m
Wafer cutting speed	0.01 to 100.00 mm/s
Return speed	100 mm/s
Control method	Semi-closed loop

3) Y-axis (spindle forward-rearward movement)

Stroke	162 mm maximum
Index setting range	0.0001 to 160.0000 mm
Minimum step	0.1 μm
Index speed	13 mm/s
Control method	Fully closed loop

4) Z-axis (spindle vertical movement)

Stroke	33 mm
Uncut amount range	0.0001 to 33.0000 mm
Minimum step	0.1 μm
Cutting feed speed	18 mm/s (max.)
Spindle escape amount	0.0001 to 33.0000 mm
Control method	Open loop

5-2. Spindle Motor

1) Rotating speed

Constantly	30,000 min^{-1} (rpm)
Variable range	3,000 to 40,000 min^{-1} (rpm)
(DC brushless motor built-in type air spindle) (Water cooling method)	

2) Output

1.5 kW at 30,000 min^{-1} (rpm)

3) Taper ratio

Thick taper equivalent to 1/20 (L-type flange)

5-3. Alignment Microscope

Monocular single objective microscope (eyepiece total magnification 100x)

5-4. Protective Functions

1) Air pressure (from the source) sensor

2) Spindle overheated sensor

6 ACCURACY

- 1) Chuck table upper surface parallelism
3 μm /100 mm diameter (on the lower disk)
- 2) Y-axis indexing accuracy

Single error:	0.5 μm
Cumulative error:	1.5 μm /160 mm
- 3) Straightness

X-axis pitching:	2 μm /210 mm
yaw:	2 μm /210 mm
Y-axis pitching:	3 μm /160 mm
yaw:	3 μm /160 mm
	(special accessory specification)
pitching:	1 μm /160 mm
yaw:	1 μm /160 mm
- 4) X and Y-axes right angle accuracy
5 μm /150 mm
- 5) Z-axis indexing repeat accuracy
1 μm /5 mm

7 UTILITIES

7-1. Power Requirements

- 1) Input voltage
200 VAC \pm 10%, 3-phase, 50-60 Hz
- 2) Power consumption
2.5 kVA
- 3) Noise
Avoid noise 2,000 V or more at a pulse width of 500 ns (square wave).
- 4) Grounding
Be sure to ground the machine.

7-2. Air/Gas Supply Source

1) Pressure

0.49 MPa·G (5.0 kgf/cm²·G) or more0.78 MPa·G (8.0 kgf/cm²·G) or lessFluctuation range should be within 0.029 MPa·G (0.3 kgf/cm²·G).

2) Consumed flow rate

250 Nℓ/min (including flow rate for vacuum generation of 70 Nℓ/min and for air gun of 80 Nℓ/min)

3) Filtration rating

0.01 μm or less

4) Solid removal

99.9999% or more

5) Oil removal

0.1 PPM wt/wt (at 30°C)

6) Atmospheric dew point

-15°C or less

(In order to grind with stable high accuracy, RD type air dryer which temperature can be controllable is available as special accessory.)

7-3. Water Used

1) Wheel coolant

Pressure

0.2 to 0.39 MPa·G (2 to 4 kgf/cm²·G) ±10%

Supplied flow rate

3.0 ℓ/min or lower

Water temperature

Room temperature +2°C

Fluctuation range within ±1°C/within 10 hours

2) Spindle coolant

Pressure

0.2 to 0.39 MPa·G (2 to 4 kgf/cm²·G) ±10%

Supplied flow rate

1.5 ℓ/min or higher

Water temperature

Room temperature ±0.5°C/within 10 hours

7-4. Water Drainage

Connection port
Duct hose nominal size: 32 mm

7-5. Duct Capacity

2.5 m³/min or larger and 5 m³/min or less

7-6. Main Dimensions

760 W x 850 D x 1,510 mm H (without protrusions)

8 INSTALLATION

For installation procedures, follow the description in the Installation Manual shipped with the machine. When reinstalling or moving the machine, consult your local DISCO office.

8-1. Standard Delivered Packing Style**1) Dimensions and weight**

Main body: 760 W x 850 D x 1,510 mm H
Approx. 6500 N (663 kgf) (signal tower not included)

8-2. Terms of Delivery

The delivery of the DAC552 will basically be FOB. If any other terms of delivery are desired, consult your local DISCO office.

8-3. Transport**1) Transportation method**

- a) Remove water inside the machine pipes such as spindle coolant and wheel coolant by utilizing the air supply of the facilities, clean the cutting chamber of the machine and dry it sufficiently.
- b) Turn off the power supply of the machine and breaker of the facilities as well as remove the main body cover.
- c) Attach metal fixtures for transportation of X, Y, Z electrical box, main body base and operation panel.
- d) Remove the power cable and the hose coming out from the backside of the machine.
- e) Screw in the four high mounts located at the lowest position of the machine and wrap the whole machine with clean plastic or the equivalent in order to prevent water and particles from entering.
- f) Move the machine by a hand pallet truck or equivalent.
- g) Connect the lifting jig to the machine installation base with M10 bolt only when the machine is lifted.