Multi-axis ultra-precision machining system

SGDT350 SERIES | SINGLE-POINT DIAMOND TURNING & PROCESS OPTIONS

The SGDT350 series offers 3-, 4- and 5-axis configurations with a machining capacity of ϕ650 mm × 300 mm [1]. Built around single-point diamond turning, the systems can be configured with grinding, high-speed milling and ultrasonic or laser assistance to suit optical and precision components.



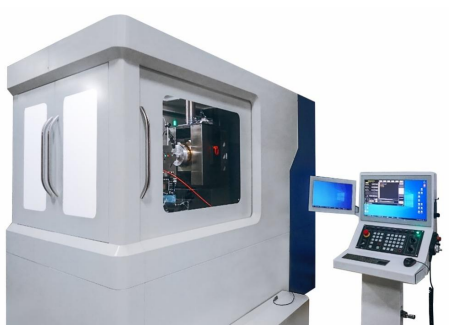
SGDT350 3 AXES

X / Z / C



SGDT350G 4 AXES

X / Z / B / C



SGDT350F 5 AXES

X / Y / Z / B / C

SYSTEM FEATURES

Static-pressure motion components
Aerostatic or hydrostatic configurations; linear motor drives.

Air spring vibration isolation
Helps reduce floor-transmitted vibration.

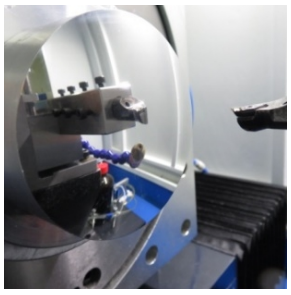
Optical surface machining
Flats, spheres and cylindrical surfaces; complex geometries depend on axes, tooling and workholding.

MATERIALS & PROCESS ASSISTANCE

Aluminum and suitable aluminum alloys, copper; nickel, single-crystal silicon and germanium subject to application review. Suitability depends on composition, condition, tooling and process.

Ultrasonic, laser or combined assistance can be configured for steel and suitable hard, brittle ceramics. Material range and performance are established through sample trials.

SERIES APPLICATION EXAMPLE [2]



Convex spherical surface machining

ϕ75 mm / SR250
High-purity aluminum alloy
Form error: PV ⩽ 0.2 μm
Roughness: Ra ⩽ 3.0 nm

MACHINING & SUPPORT OPTIONS

Machining: Grinding, high-speed milling, fast tool servo, ultrasonic / laser assistance, combined laser-ultrasonic assistance and in-situ balancing.

Metrology: Optical measurement and tool setting, contact tool setting and microscope-assisted centering.

Support: Vacuum workholding, zero-point locating, video monitoring, chip collection, mist lubrication, cooling and air treatment / filtration.

Options are selected by model and process.

Apex Ultra-Precision Technology (Nanjing) Co., Ltd.

www.apex-upt.com sales@apex-upt.com

Office: Room 614, Huishang Building, Dongshan Street, Jiangning District, Nanjing, China

CNC command specifications [3]	Specification
Linear programming resolution	⩽ 0.01 nm
Rotary programming resolution	⩽ 0.0000001°

Spindle configurations [4]	Aerostatic spindle	Hydrostatic spindle
Speed	Max. 10000 r/min	0-1500 r/min
Load capacity	50 kg	120 kg
Axial stiffness	⩾ 350 N/μm	⩾ 600 N/μm
Radial stiffness	⩾ 130 N/μm	⩾ 200 N/μm
Rotational accuracy [5]	< 30 nm	< 50 nm
Workholding	Vacuum chuck	Vacuum chuck

Linear-axis specifications	X	Y	Z
Applicable models	All models	SGDT350F only	All models
Travel	350 mm	150 mm	300 mm
Guideway type	Hydrostatic / aerostatic	Hydrostatic / aerostatic	Hydrostatic / aerostatic
Drive	Linear motor	Linear motor	Linear motor
Positioning repeatability [6]	⩽ 0.5 μm	⩽ 0.5 μm	⩽ 0.5 μm
Maximum travel speed	4000 mm/min	2000 mm/min	4000 mm/min
Straightness / test length [6]	0.3 μm / 300 mm	0.3 μm / 150 mm	0.3 μm / 300 mm
Vertical-axis balance	-	Adaptive pneumatic counterbalance (hydrostatic option)	-

Rotary-axis specifications [4-6]	B axis	C axis: aerostatic configuration
Applicable models	SGDT350G / SGDT350F	All models
Bearing type	Hydrostatic	Aerostatic
Drive	Torque motor direct drive	Torque motor direct drive
Maximum speed	50 r/min	3000 r/min
Angular travel	0°-360°	Configuration-specific
Axial / radial stiffness	⩾ 800 / ⩾ 210 N/μm	Configuration-specific
Angular positioning repeatability	⩽ 1.0 arcsec	⩽ 1.0 arcsec
Rotational accuracy [5]	< 100 nm	Configuration-specific

Installation and utilities	Specification / configuration
Vibration isolation	Air spring isolation
Reference operating temperature	20 °C ± 0.5 °C
Base power supply	Three-phase, five-wire; 380 V; 50 Hz
Air supply and installation	Clean, dry air; inlet requirements, dimensions and service space are supplied for the selected configuration.

[1] Machining capacity: ϕ650 mm × 300 mm; larger capacities can be evaluated. Usable capacity is checked against the workpiece, workholding, tooling and motion clearance.

[2] PV ⩽ 0.2 μm and Ra ⩽ 3.0 nm refer to the shown high-purity aluminum alloy ϕ75 mm, SR250 convex spherical example from this series. They are not universal guarantees for every model, the full machining capacity or other materials. Evaluation and acceptance follow the technical agreement.

[3] Programming resolution is the numerical increment of CNC commands, not feedback resolution, positioning accuracy or machining accuracy. Applicability depends on the selected controller.

[4] Spindle options and the aerostatic C axis are specified separately; 3000 r/min does not apply to the hydrostatic spindle. Spindle/C-axis arrangement and interpolation follow the selected configuration. Maximum load, maximum speed and stated accuracy should not be assumed to apply simultaneously.

[5] Rotational accuracy is expressed as a length-based specification. Direction, error components, measurement position and conditions follow the component test definition; it is not angular positioning accuracy.

[6] Repeatability follows the agreed direction and evaluation method. Straightness applies to the stated test length without extrapolation; its measurement direction, limit definition and acceptance method follow the technical agreement.