SGDT350G

4-axis ultra-precision single-point diamond turning machine

The SGDT350G combines X and Z linear axes with B and C rotary axes for ultra-precision turning of optical and precision components. Static-pressure bearings, linear motor drives and air spring isolation support the machining process. Process plans are matched to material, geometry and surface requirements.



X / Z / B / C — **4 AXES**

MATERIALS

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

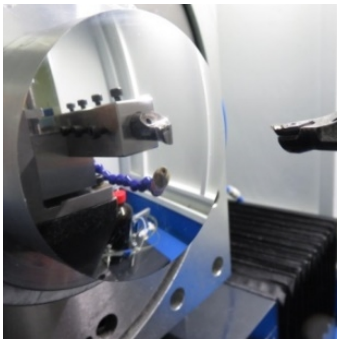
Static-pressure bearings and linear drives
Static-pressure guideways and spindle; linear motor drives.

Air spring vibration isolation
Helps reduce floor-transmitted vibration.

Optical surface machining
Flats, spheres and cylindrical surfaces; complex geometries depend on the selected setup.

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

MACHINING APPLICATION EXAMPLE



Convex spherical surface machining

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

CONFIGURATION 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; microscope-assisted centering.

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

Option availability is confirmed by model and process.

KEY SPECIFICATIONS

Machining capacity [1]	ϕ650 mm × 300 mm
Case form error [2]	PV ⩽ 0.2 μm ϕ75 mm / SR250
Case roughness [2]	Ra ⩽ 3.0 nm High-purity aluminum alloy
Linear travel	X: 350 mm · Z: 300 mm

PV and Ra correspond to the high-purity aluminum alloy convex spherical case shown here; see conditions overleaf. Programming resolution is not machining accuracy.

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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	Z
Travel	350 mm	300 mm
Guideway type	Hydrostatic / aerostatic	Hydrostatic / aerostatic
Drive	Linear motor	Linear motor
Positioning repeatability [6]	⩽ 0.5 μm	⩽ 0.5 μm
Maximum travel speed	4000 mm/min	4000 mm/min
Straightness / test length [6]	0.3 μm / 300 mm	0.3 μm / 300 mm

Rotary-axis specifications [4-6]	B axis	C axis: aerostatic configuration
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] Form error PV ⩽ 0.2 μm and roughness Ra ⩽ 3.0 nm both correspond to the high-purity aluminum alloy ϕ75 mm, SR250 convex spherical machining case shown in this brochure. These case specifications are not universal guarantees across the full machining capacity or other materials. Evaluation and acceptance conditions 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] The two spindle options and aerostatic C-axis specifications are listed separately. The 3000 r/min value does not apply to the hydrostatic spindle. Spindle/C-axis architecture and interpolation depend on configuration. Maximum load, speed and accuracy are not 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.

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