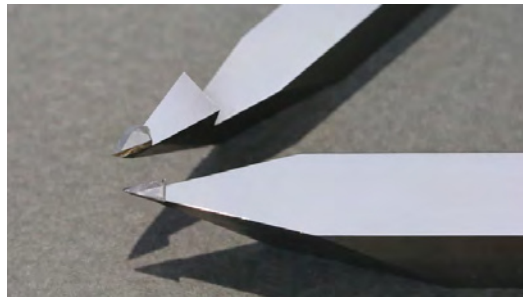


SCD precision tools for lenses, optics and microstructures

Single crystalline diamond tools with contact-lens codes, SPC geometry and designs for Satisloh and Schneider.



EHWA Europe GmbH

www.ehwadia.de

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Precision edges for optical surfaces

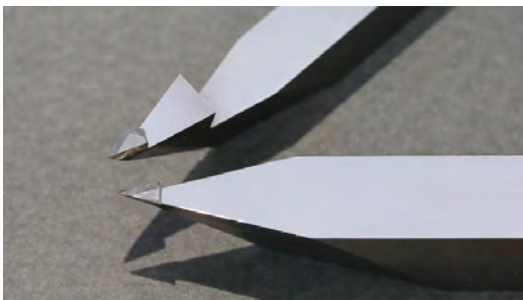
Single crystalline diamond cutting tools for contact lenses, intraocular lenses, plastic aspheres, display films and microstructures

EHWA DIAMOND - since 1975

SCD stands for Single Crystalline Diamond. EHWA offers cutting tools with natural diamond, synthetic HPHT mono diamond and single crystalline CVD diamond. Tool design considers crystal orientation, the required cutting-edge contour and the machine interface.

The programme addresses precision machining of non-ferrous materials. Sharp, finely finished edges support mirror surfaces and machining with low burr formation. Tool life and cutting quality are matched to the workpiece, geometry and process. The illustrated tools are application-specific designs.

Application	Machining task
Contact lenses	Finish inner and outer surfaces
Intraocular lenses (IOL)	Turn aspheric surfaces and mill stepped contours
Electro-optic components	Machine precision moulds for plastic aspheres
Display components	Light guide panels, polarising and prism pattern films; patterned copper rolls
Microstructures	Shape radii, produce grooves and make imprinting geometries
Spectacle lenses	Machine-specific SCD inserts for lens machining



SCD cutting tools with diamond edges as product examples.

Contact lenses: match tool, edge and holder

For contact-lens machining, EHWA lists natural and synthetic diamond, insert and solid-tool designs, and controlled or non-specified edge waviness. Cylindrical and conical clearance geometries are available. The diamond tip is high-vacuum brazed.

Edge inspection addresses microchipping at 1,000x magnification. The surface objective is finely finished inner and outer surfaces with low scratching and burr formation. Regrinding or relapping is offered as a tool service; suitability is assessed against the remaining geometry.

Contact-lens code and selection

Feature	Code	Design
Diamond	EN	Natural diamond
Diamond	EM	HPHT mono diamond
Diamond	EV	Single crystalline CVD diamond
Insert shape	D	55°; DCGW0702 or DCMW11T3
Insert shape	V	35°; VCGW1103
Radius	R025; R03; R05	R0.25; R0.3; R0.5
Clearance angle	CA10; CA12; CA15; CA16; CA18	10°; 12°; 15°; 16°; 18°
Clearance geometry	CO; CY	Conical; cylindrical
Controlled edge waviness	W005	≤0.05 µm
Controlled edge waviness	W01	≤0.1 µm
Controlled edge waviness	W02	≤0.2 µm
Controlled edge waviness	W03	≤0.3 µm
Controlled edge waviness	W05	≤0.5 µm
Further waviness option	Without a controlled waviness class	Design according to radius and clearance geometry

The source example EV-D-R03-CA15-CO-W03 identifies single crystalline CVD diamond, a DCGW0702 design, R0.3, 15° clearance angle, conical clearance geometry and class W03 with edge waviness ≤0.3 µm.

The special-design row for contact-lens tools lists single crystalline (110) 2pt diamond, radii 0.1-1.0 and clearance-angle codes CA01-CA20. Contour design depends on radius and clearance geometry. These details are specified with the tool drawing; the radius values in this table do not have an explicitly printed unit.

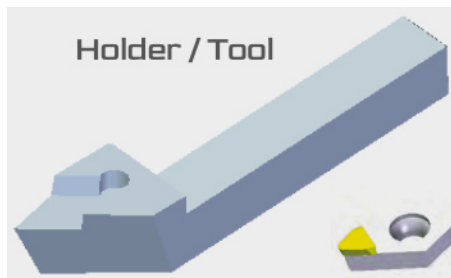
The holder system includes centre, right-hand and left-hand orientations with angle offset. Solid-tool and insert designs are available. Holder length, width and thickness can be matched to the interface; a tungsten-carbide shank is listed.



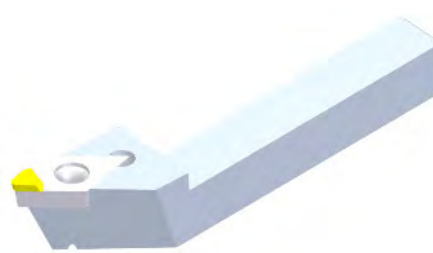
Contact lens: inner surface.



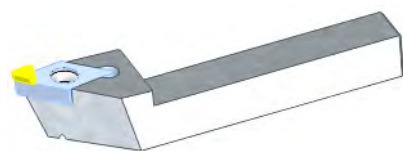
Contact lens: outer surface.



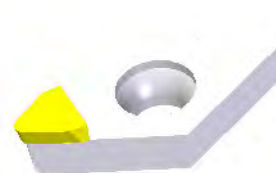
Contact-lens tool: insert design.



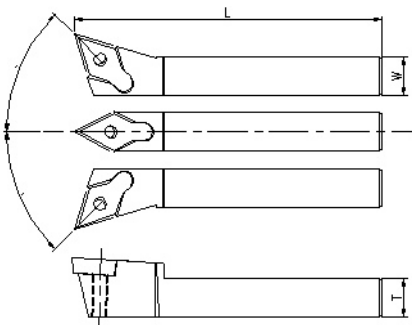
Contact-lens tool: solid-tool design.



Contact-lens tool with carbide holder.



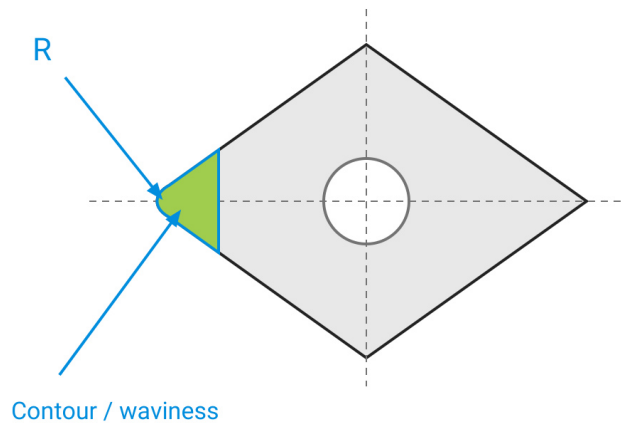
Diamond edge on the contact-lens insert.



Holder system with centre, right-hand and left-hand orientations; drawing dimensions L, W and T.

Contact-lens tool: R, T and clearance angle

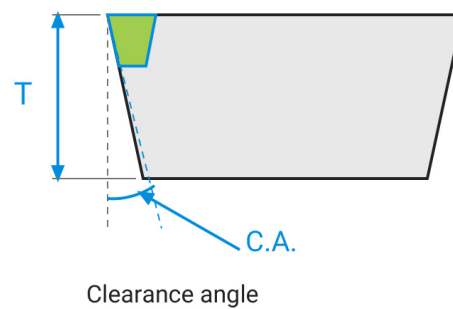
Top view



R: edge radius · T: insert thickness

Schematic; not a dimensioned product drawing.

Side view



Contact-lens tool: edge radius, insert thickness and clearance angle.

Intraocular lenses: turning and milling

For IOL machining, EHWA offers SCD tools for aspheric turned surfaces and stepped milled contours. Diamond-edge position is matched to the machining task.

Feature	Design
Diamond	Natural or synthetic diamond
Tool construction	Insert or solid-tool design
Process	Turning or milling
Clearance geometry	Cylindrical or conical
Diamond attachment	High-vacuum brazing
Edge inspection	Assess microchipping at 1,000x magnification



Application example: intraocular lens.



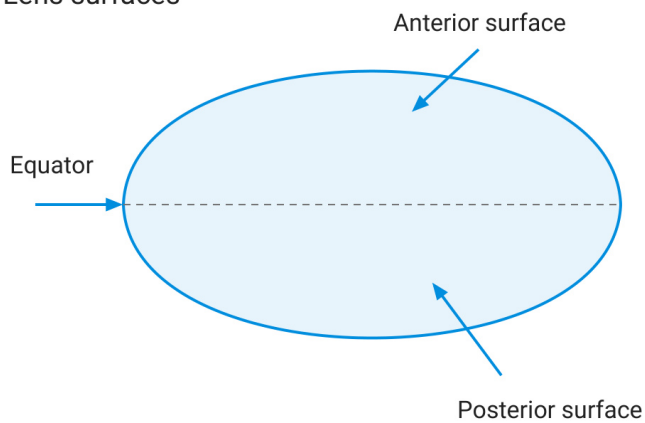
SCD insert for IOL machining.



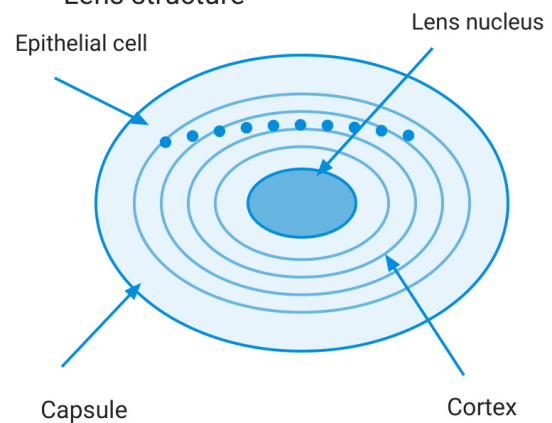
Solid tool for IOL machining.

Lens context and IOL machining

Lens surfaces



Lens structure



IOL: turn aspheric surfaces; mill stepped contours.

Schematic lens context from the EHWA application illustration.

Schematic; not a dimensioned product drawing.

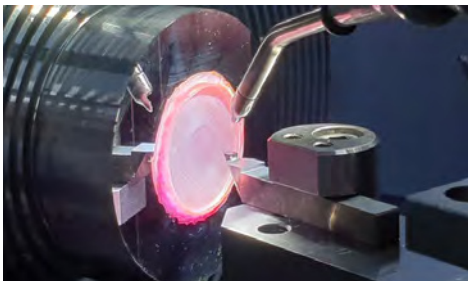
Localised lens context and IOL machining tasks.

SPC tools for plastic aspheres

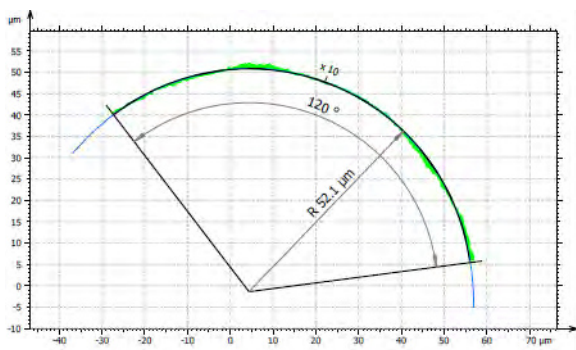
SPC stands for Super-Precision Cutting tools. The programme includes single crystalline diamond edges for machining high-precision lens moulds. The selection below separates standard and special designs; its values are not merged with the general SCD ranges.

Geometry	Standard	Special design
Radius	0.01-1.0 mm	<0.01 mm
Included angle I.A.	$\geq 30^\circ$	$< 30^\circ$
Effective cutting angle W.A. (Window Angle)	$\leq 100^\circ$	$> 100^\circ$
Clearance angle C.A.	$\leq 15^\circ$	$> 15^\circ$
Edge waviness / contour accuracy	$\leq 0.3 \mu\text{m}$ (300 nm)	$\leq 0.1 \mu\text{m}$ (100 nm)
Clearance geometry	Cylindrical or conical	Cylindrical or conical

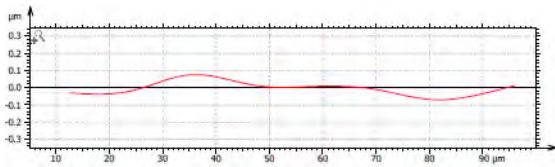
EHWA also lists edge waviness <50 nm as an available design. This application-specific option is agreed separately. It does not replace the table's standard and special classes. Dimensional and contour inspection form part of defining the required tool design.



Machining example for electro-optic components.



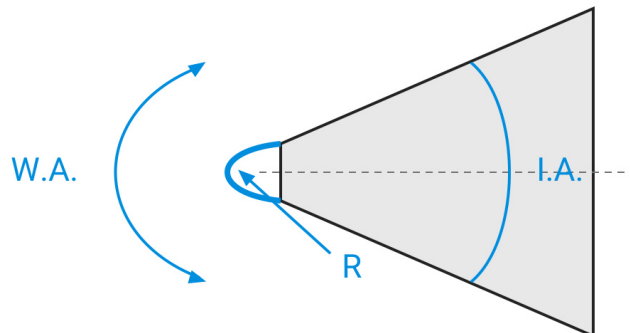
Measurement example for radius contour and effective cutting angle.



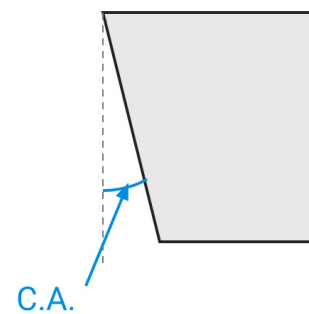
Measurement example: edge waviness over the measured distance.

SPC: radius and cutting angles

Top view



Side view



R: Edge radius

I.A.: Included angle

W.A.: Effective cutting angle

C.A.: Clearance angle

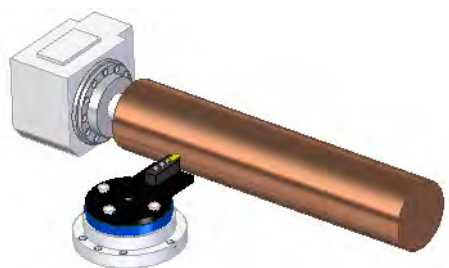
SPC waviness: standard $\leq 0.3 \mu\text{m}$; special design $\leq 0.1 \mu\text{m}$.

Schematic; not a dimensioned product drawing.

SPC geometry: radius, included angle, effective cutting angle and clearance angle.

Tools for display films and patterned rolls

The display programme includes light guide panels (LGP), polarising films and prism pattern films. SCD tools are designed for mirror surfaces and machining large copper rolls for pattern films. Diamond orientation, edge profile and holder are matched to the required structure.



Roll machining for pattern films.



Detail of the illustrated roll pattern.



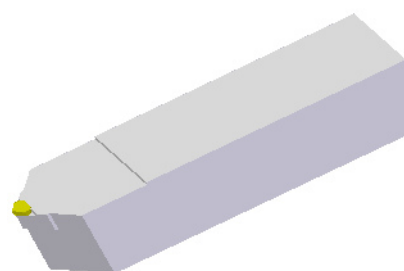
SCD display tool: design 1.



SCD display tool: design 2.



SCD display tool: design 3.

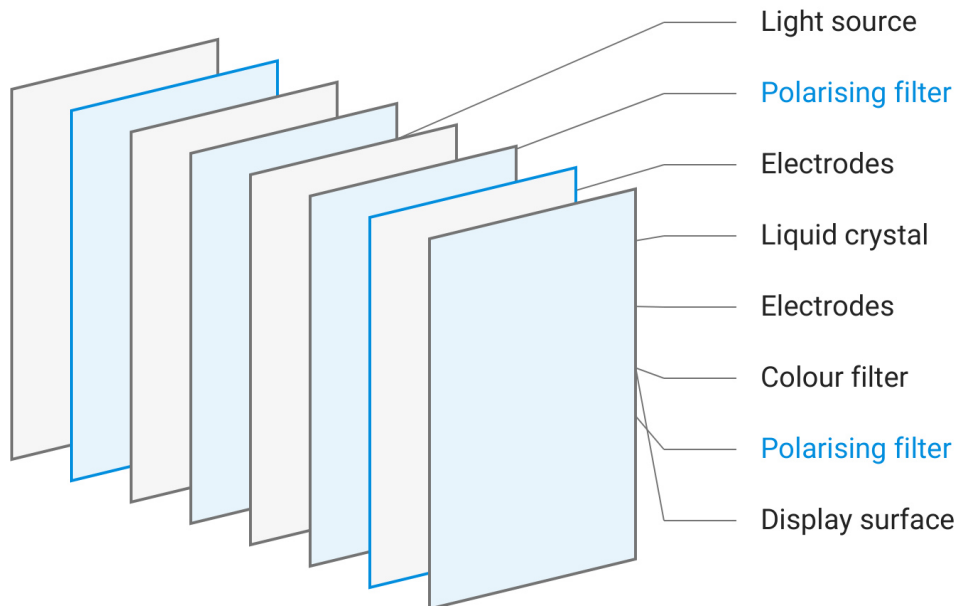


SCD display tool: design 4.



SCD display tool: design 5.

Display: LCD components



LGP / polarising film / prism pattern film

Machining examples from the SCD display programme.
Schematic; not a dimensioned product drawing.

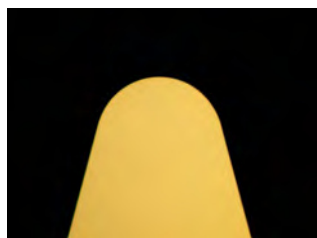
LCD components and SCD display applications.

Microstructure tools: nine illustrated profiles

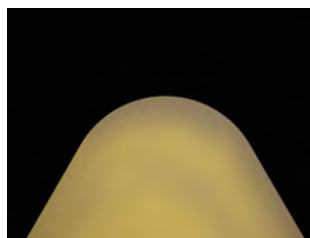
EHWA offers custom SCD tools for structure and pattern machining. The illustrated shapes comprise radius profiles, groove geometries and imprinting forms. The profile is defined from the required structure.

Group	Illustrated design
Radius profiles	Small radius
Radius profiles	Large radius
Radius profiles	Engraving radius
Groove geometries	V-shaped
Groove geometries	Microgroove
Groove geometries	Chamfered groove
Groove geometries	Chamfer with a radiused edge
Imprinting forms	Angled punch shape
Imprinting forms	Conical punch shape

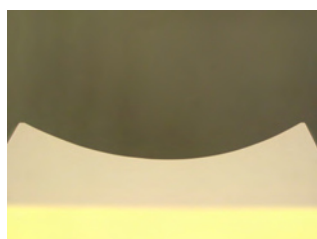
The profile images show the design types. They contain no binding dimensions; radii, angles and profile dimensions are specified against the drawing.



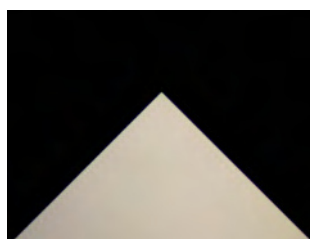
SCD profile: small radius.



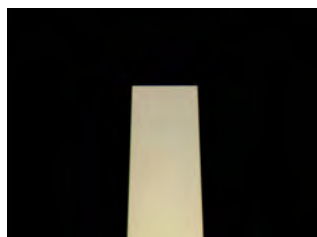
SCD profile: large radius.



SCD profile: engraving radius.



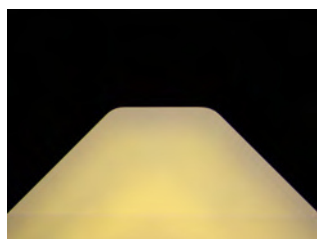
SCD profile: V-shaped.



SCD profile: microgroove.



SCD profile: chamfered groove.



SCD profile: chamfer with a radiused edge.



SCD imprinting form: angled punch.



SCD imprinting form: conical punch.

Spectacle-lens machining: designs for Satisloh and Schneider

The SCD document shows five machine-related insert designs. Part numbers and the two Schneider angle variants are retained separately. Machine, interface and required geometry are checked together before specifying the tool.

Machine assignment	Source part number	Edge	Radius designation	Further geometry
Satisloh VFT	92-007-626	Single crystalline diamond	R2.0	-
Satisloh	92-06-3012	Single crystalline diamond	R2.0	-
Satisloh	No part number printed	Single crystalline diamond	R2.0	Twin hole; 120° Window Angle
Schneider	DB-07-2003	Single crystalline diamond	R2.0	120° Window Angle
Schneider	DB-07-2003	Single crystalline diamond	R2.0	90° Window Angle

R2.0 is retained as the source radius designation. Unit and fit are specified using the controlling tool drawing. The machine and part-number assignments document EHWA's design examples.



Satisloh VFT: 92-007-626, R2.0.



Satisloh: 92-06-3012, R2.0.



Satisloh twin-hole design: R2.0, 120° Window Angle.



Schneider DB-07-2003: R2.0, 120° Window Angle.



Schneider DB-07-2003: R2.0, 90° Window Angle.

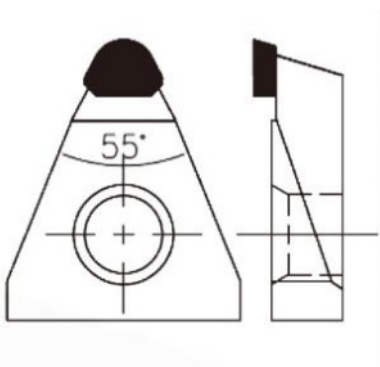
Supplementary GT codes for optical lenses

The supplementary EHWA document Q223 lists three GT codes for spectacle and free-form lenses. It states edge inspection at 800x magnification and a regrinding service. These codes are retained as distinct source cards.

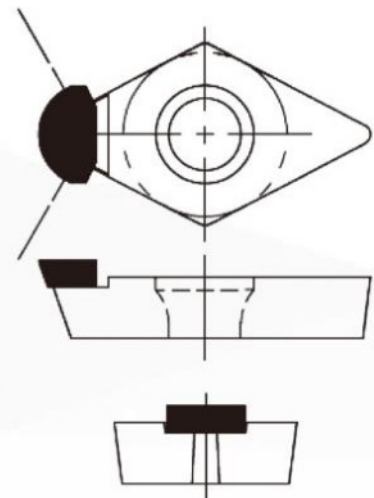
Machine assignment	EHWA code	Source-card description	Source manufacturer part number
Satisloh VFT	GT-92-007-626	Monocrystalline insert; turning tip MCD, R2 mm	92-007-626
Schneider	GT-DB-07-2003	Monocrystalline insert; 120° Included Angle	Call Us
Schneider	GT-DB-07-2004	Monocrystalline insert; 90° Included Angle	Call Us

The Satisloh source drawing shows 55°. The GT card expressly specifies radius R2 mm. Both Schneider cards use the term Included Angle; Q269 labels the angles of its designs as Window Angle. These source descriptions remain separate and are checked against the controlling tool drawing. GT-DB-07-2004 is not silently renamed to manufacturer part number DB-07-2003.

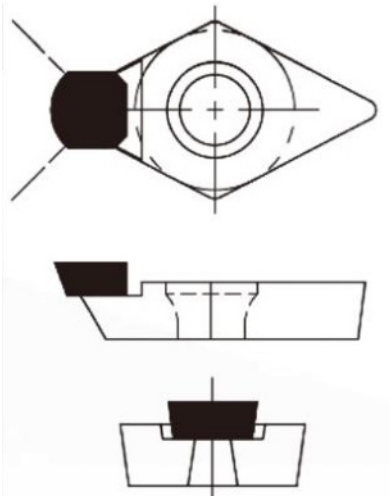
Technical source: Q223, physical PDF page 21. The remaining content of this trade-show document belongs to the consolidated cutting-tool programme.



GT-92-007-626: Satisloh VFT source drawing with 55°.



GT-DB-07-2003: Schneider source drawing.



GT-DB-07-2004: Schneider source drawing.

General SCD geometry and design code

The general SCD overview distinguishes diamond, radius, included angle, clearance angle, clearance geometry, edge waviness and insert shape. The printed code example is N-R003-IA30-CA15-CY-WV01-D. Individual fields are checked against the drawing when enquiring; numerical encoding is not fully explained for every field.

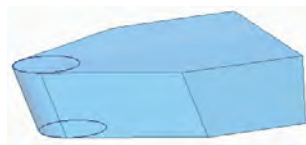
Feature	Printed range or selection
Diamond	Natural diamond; Mono; SCVD
Standard radius	$0.1 \leq R \leq 10$
Special radius	$0.0005 \leq R < 0.1$
Standard I.A.	$30^\circ \leq \text{I.A.} \leq 180^\circ$
Special I.A.	I.A. $< 30^\circ$
Clearance angle C.A.	$0^\circ \leq \text{C.A.} \leq 25^\circ$
Clearance geometry	CY: cylindrical; CO: conical
Waviness classes	$\leq 0.05 \mu\text{m}$ (50 nm); $\leq 0.1 \mu\text{m}$ (100 nm); $\leq 0.3 \mu\text{m}$ (300 nm); $\leq 1.0 \mu\text{m}$; $\leq 2.0 \mu\text{m}$
Shape C	80°
Shape D	55°
Shape S	90°
Shape T	60°
Shape V	35°
Shape X	Special shape

The general overview prints no unit for the radius limits. The separate SPC table specifies millimetres. Tool ordering therefore uses the corresponding drawing with its unit.

EHWA describes conical clearance geometry as providing a circular contour and a comparatively weaker edge structure; regrinding reduces the radius. Cylindrical clearance geometry is described with an elliptical effect, a comparatively stronger edge structure and a constant radius after regrinding. Selection considers the contour objective and reconditioning strategy.



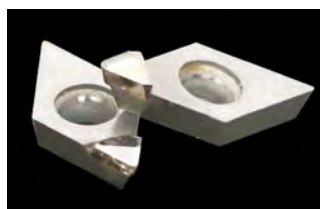
Conical clearance geometry.



Cylindrical clearance geometry.



SCD solid tool as a design example.

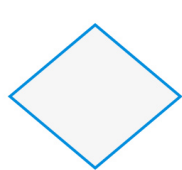


SCD inserts as design examples.

SCD design code and insert shapes

N	R003	IA30	CA15	CY	WV01	D
Diamond	Radius	Included angle	Clearance angle	Clearance geometry	Waviness	Shape

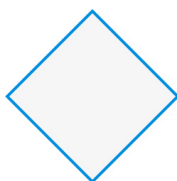
Printed example; check numerical fields against the drawing.



C 80°



D 55°



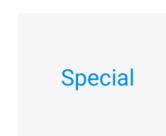
S 90°



T 60°



V 35°



Special

X

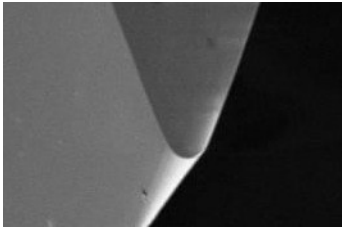
CY: cylindrical · CO: conical

Schematic; not a dimensioned product drawing.

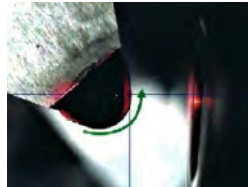
SCD code fields and insert shapes C, D, S, T, V and X.

Edge and profile inspection

EHWA lists microscopy, scanning electron microscopy (SEM) and 3D measurement for assessing contour accuracy, roughness, profile and further dimensions. Edge inspection shows examples at 50x and 500x magnification; application-specific features additionally mention inspection at 1,000x. Profile analysis of rotating tools is illustrated using 3D measurement.



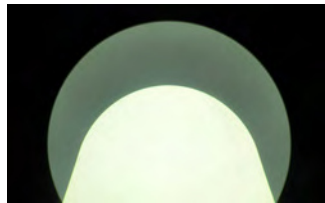
Edge inspection at 50x magnification.



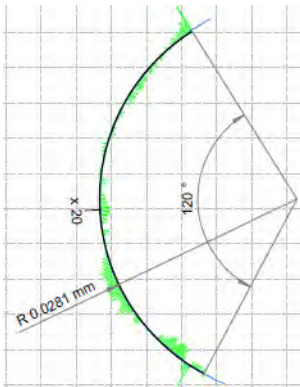
Edge inspection at 500x magnification.



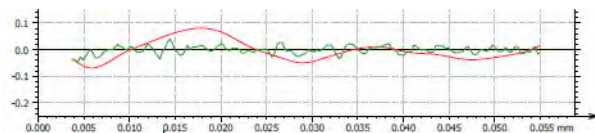
Edge contour: inspection example 1.



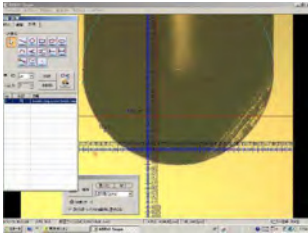
Edge contour: inspection example 2.



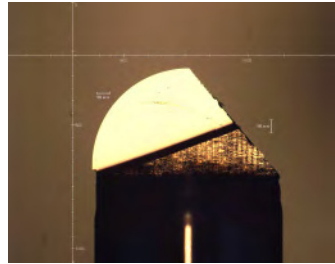
Contour inspection with the illustrated measured profile.



Edge-waviness inspection example.



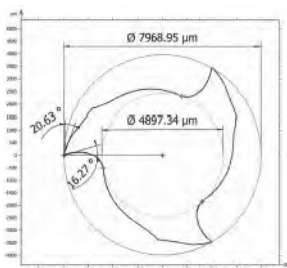
Rotating-tool profile inspection: example 1.



Rotating-tool profile inspection: example 2.



Rotating tool under inspection.



Measurement example for a rotating-tool profile.

Match your precision application

An enquiry benefits from a workpiece drawing, material, hardness (HRC / HRB / HB), target roughness (Ra / Rz / Rmax), machine manufacturer, interface and machining process. Add cutting speed in m/min, spindle speed in rev/min, feed in mm/rev or mm/min, depth of cut in mm and the number of passes.

Describe continuous or interrupted cutting; the EHWA enquiry fields distinguish light, medium and heavy interruption. State dry machining or internal or external coolant supply. Tool life can be recorded using operating time and piece count.

Tool information comprises specification, comparison tool, cutting material and shank. The SCD enquiry sheet lists natural diamond, Mono and SCVD, as well as PCD, PCBN, CVD and further cutting materials; shanks include carbide, steel, carbide/steel, SUS stainless steel, titanium or other materials. Processes include turning, milling, boring, grooving/parting, reaming, endmilling, drilling and wear-part applications; an undecided process assignment can be defined together.

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Editorial date: 14 October 2026. Technical basis: EHWA SCD, 14 pages, printed 2024.07. Earlier SCD editions and short SCD/Wear Parts overviews were checked for unique content.