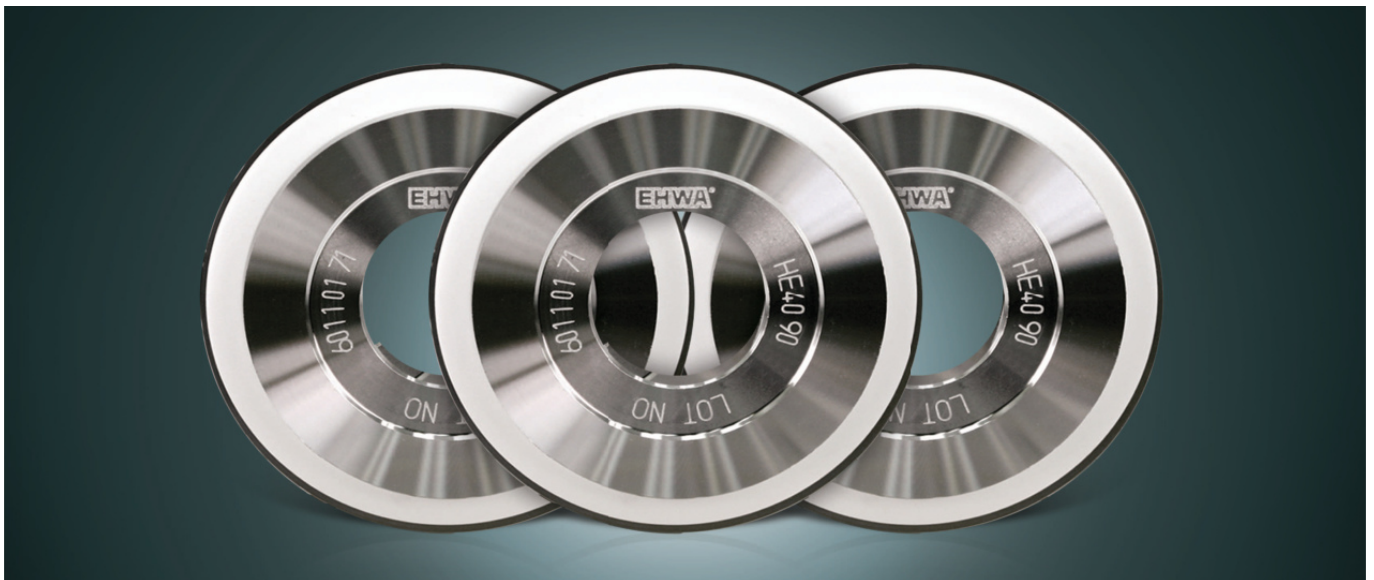


Dicing and Microblades - Complete Product Programme

Hub blades, metal- and resin-bonded microblades and electroformed nickel blades: applications, minimum thicknesses, selection ranges and complete product comparisons.



EHWA Europe GmbH

www.ehwadia.de

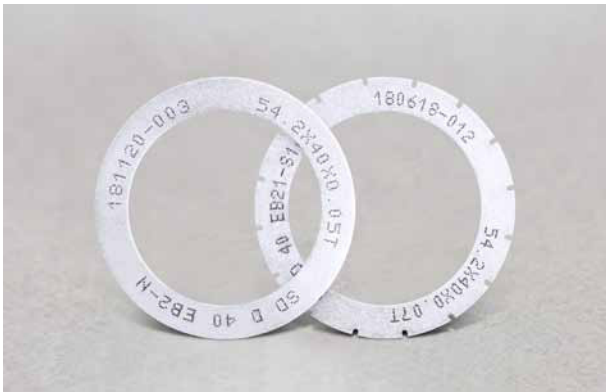
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Dicing and microblades for electronic components

EHWA develops thin diamond blades for silicon wafers, compound semiconductors, electronic packages and hard, brittle materials. Hub blades, free-standing metal- or resin-bonded microblades and electroformed nickel blades offer different ways to match kerf width, cut quality and productivity to the component.

Development targets precise cuts, reduced chipping and consistent machining quality. Controlled abrasive particle-size distribution supports these goals; high feed speeds can improve productivity. EHWA tailors the blade configuration to the customer application.



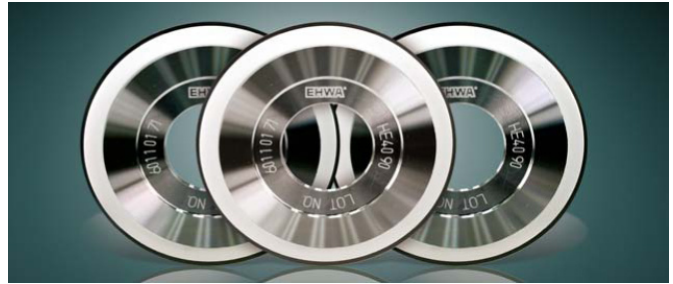
Electroformed, free-standing microblades; markings on the original tools are retained.

Hub dicing blades

The dicing blades combine high manufacturing accuracy with a very thin cutting section. New bond development addresses silicon and compound semiconductors. Reduced top- and backside chipping and high feed speeds are central development goals.



Hub blades from the Dicing, 5.dicing product edition.



Hub blades from the Dicing Blade product edition.

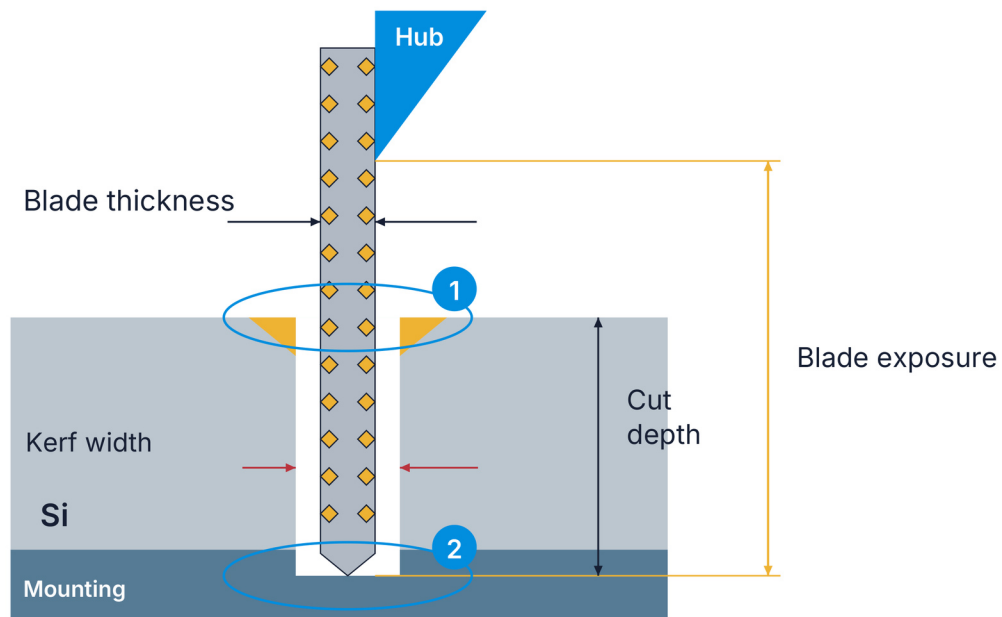


Hub blades from the Dicing Blade New product edition.

Cut geometry and edge chipping

Blade thickness describes the cutting body. Kerf width refers to the resulting slot in the workpiece and is shown as a separate dimension. Blade exposure extends from the hub to the cutting end; cut depth is measured from the wafer top surface to the cutting end. The mounting lies beneath the silicon wafer. The top and backside edges may exhibit different chipping mechanisms.

Si-wafer dicing: cut geometry

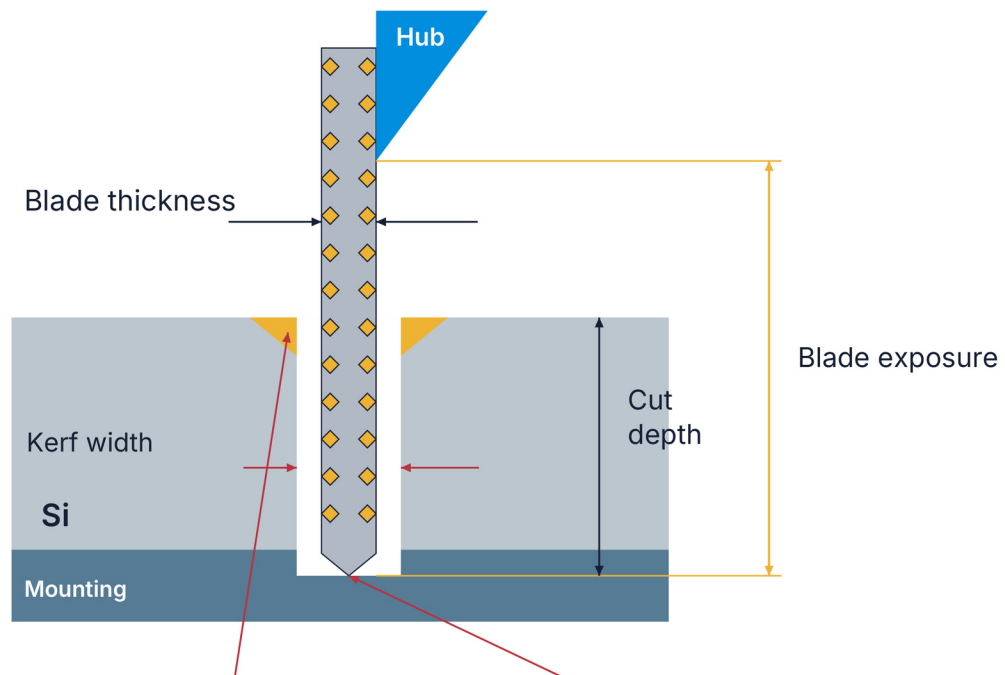


1: Top edge · 2: Backside edge

Schematic based on Dicing

Schematic cut geometry showing hub, blade thickness, kerf width, blade exposure, cut depth, silicon and mounting. 1 denotes the top edge and 2 the backside edge.

Si-wafer dicing: cut geometry

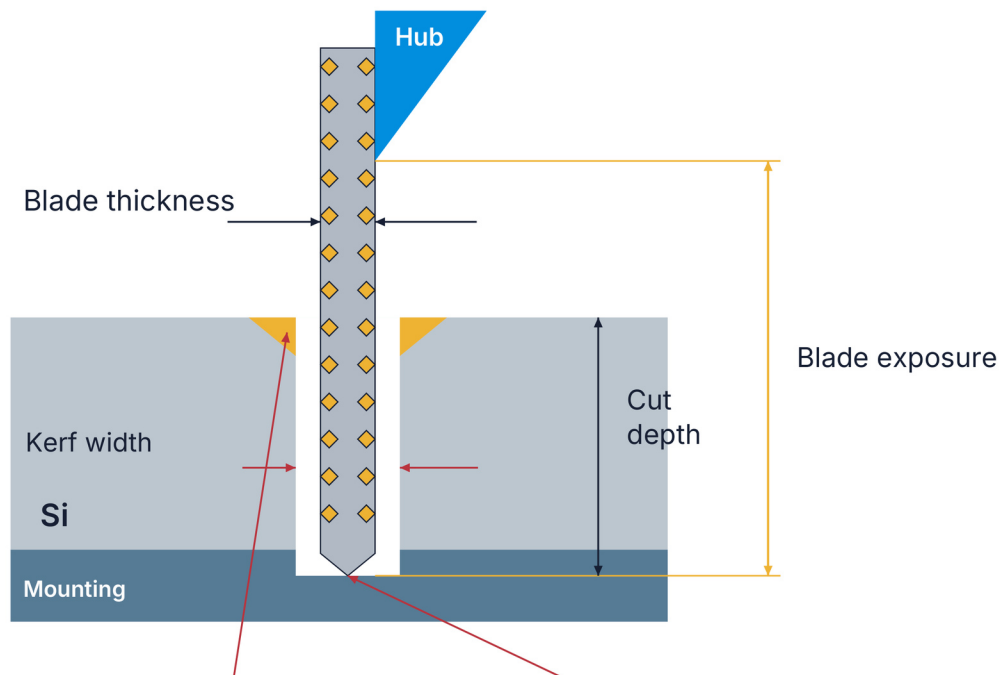


Chipping at the top edge and backside edge

Schematic based on Dicing Blade

Schematic cut geometry from edition Dicing Blade: indications of chipping at the top and backside edges.

Si-wafer dicing: cut geometry



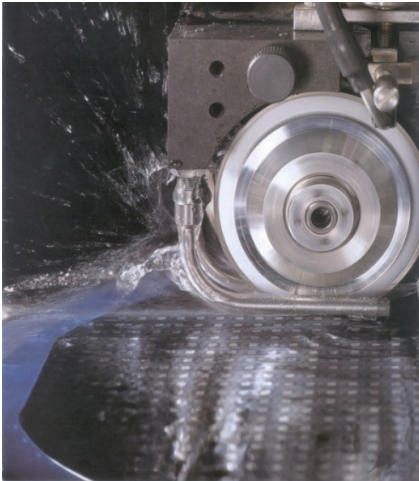
Chipping at the top edge and backside edge

Schematic based on Dicing Blade New

Schematic cut geometry from edition Dicing Blade New: indications of chipping at the top and backside edges.

Area	Comparison in the dicing product sheets
Wafer top side	Wet cutting with coolant; fine diamond grit is associated with small top-side chips.
Wafer backside	The illustrated model contrasts dry cutting without coolant and coarser diamond grit, with high cutting ability and reduced load on each grit.

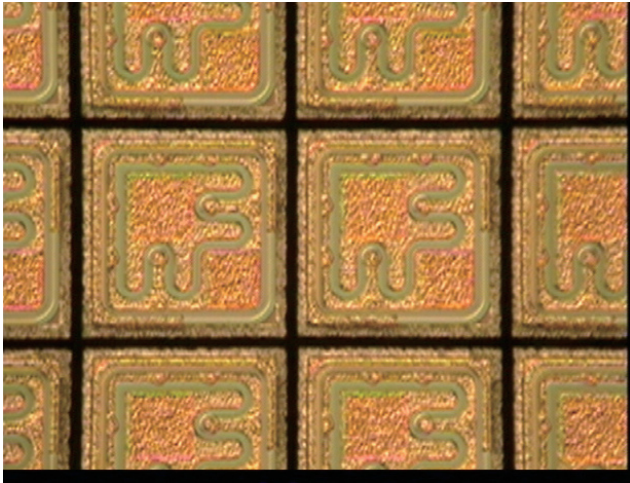
This comparison describes the model in the dicing product sheets. For thin wafers, finer grit can also reduce backside chipping. Grit size, feed speed, spindle speed, workpiece thickness, coolant and mounting must therefore be matched together to the specific cut. Coolant conditions follow the approved machine and application process.



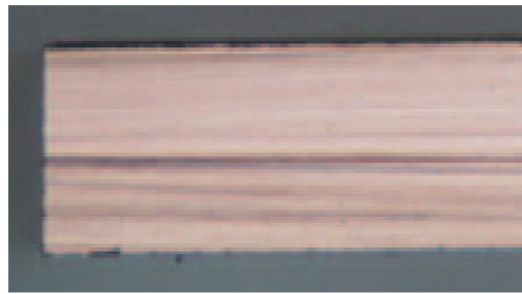
Original photograph of machining with coolant supply.

New bonds for silicon and compound semiconductors

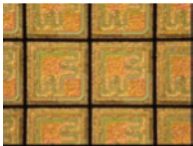
The illustrated bond development combines reduced top- and backside chipping with the ability to operate at high feed speeds. The application images below show the top side and the side/backside cut zone. The images do not specify a numeric chipping limit.



Top-side cut quality, original image from Dicing.



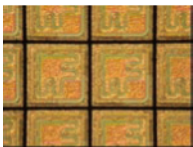
Side and backside cut quality, original image from Dicing.



Top-side cut quality, original image from Dicing Blade.



Side and backside cut quality, original image from Dicing Blade.



Top-side cut quality, original image from Dicing Blade New.



Side and backside cut quality, original image from Dicing Blade New.

Microblades: applications and benefits

Metal- and resin-bonded microblades are designed for precise cutting with a narrow kerf. Free-cutting behaviour supports high spindle speeds and fast feeds. Blade development focuses on reduced chipping, cut quality and shape retention.

Application group	Components and materials
Electronic packages	QFN, FBGA, CSP, MCP, POP, PBGA
Sawing and grooving	Ferrite, ceramic, glass, quartz and sapphire



Free-standing microblades from product edition Micro-Blade 2018.



Free-standing microblades from product edition Micro-Blade.



Free-standing microblades from product edition Micro-Blade 2018 New.

Minimum blade thicknesses

The three microblade product editions specify the same minimum thicknesses for the diameter groups below. Outer diameter, original inch designation and blade thickness are listed separately. The inch designations are size classes used in the product sheets, rather than exact conversions of the stated millimetre ranges.

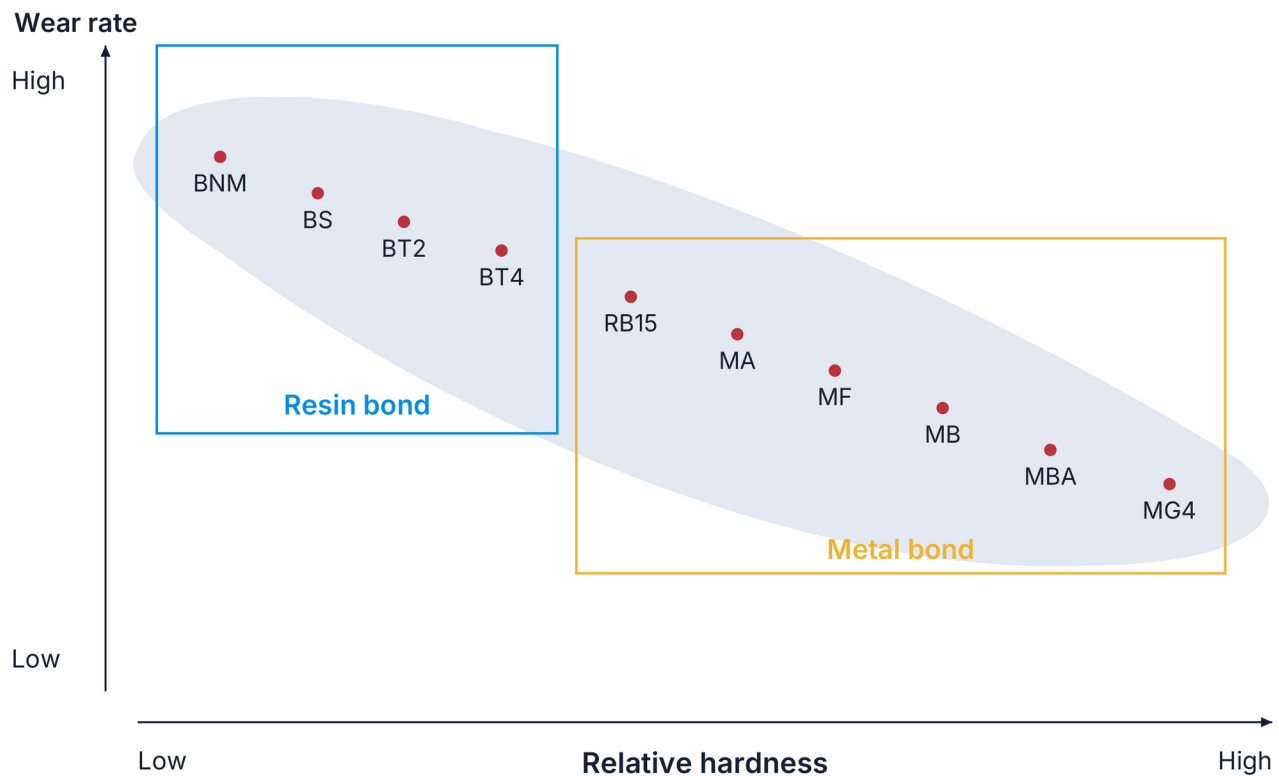
Outer Ø (mm)	Size class (inch)	Metal (mm)	Resin (mm)	Electroformed (mm)
52-60	2.5	0.10	0.10	0.08
75-78	3	0.15	0.15	-
100-115	4	0.15	0.20	-
120-130	5	0.20	0.25	-

-: No minimum value is specified for electroformed blades in this diameter group.

Bond series: wear rate and relative hardness

The qualitative relationship compares resin series BNM, BS, BT2 and BT4 with metal series RB15, MA, MF, MB, MBA and MG4. Relative hardness increases to the right; the illustrated wear rate ranges from low at the bottom to high at the top. The series lie within an overlapping range.

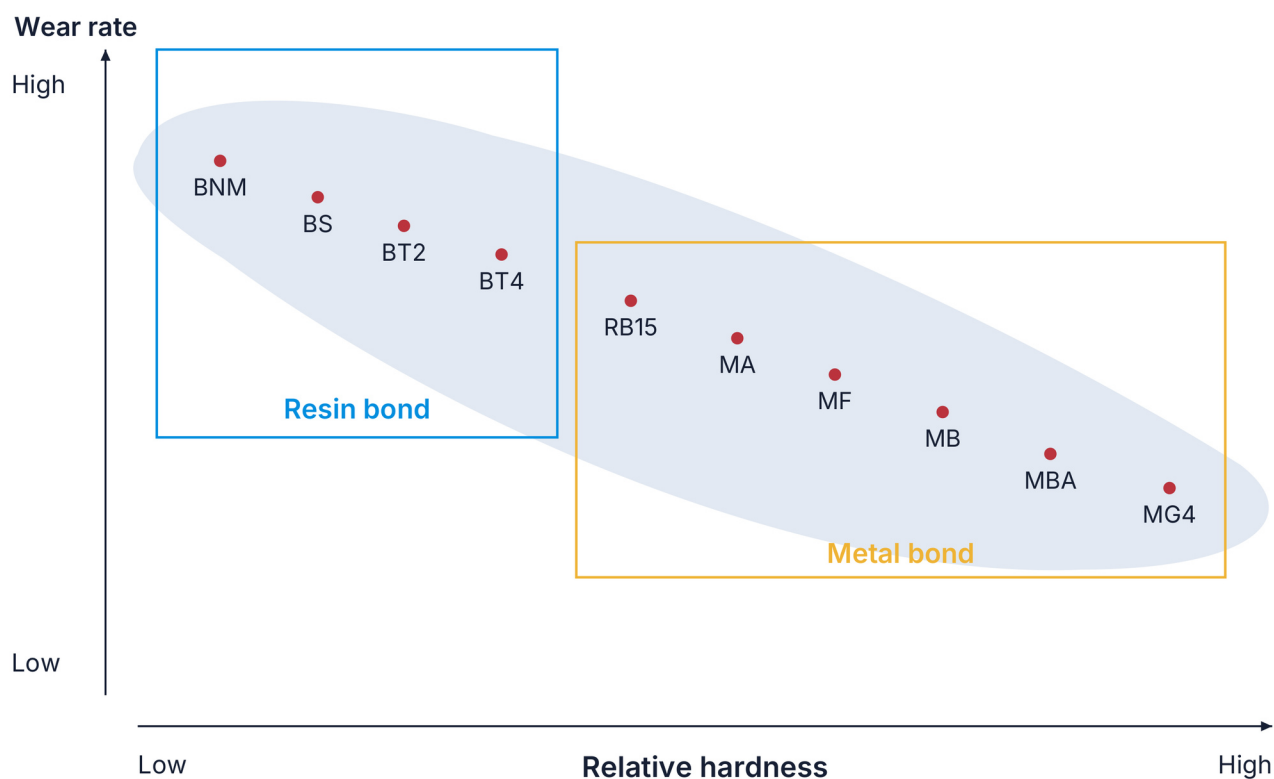
Microblades: wear rate and relative hardness



Qualitative relationship; the source provides no numeric axis values.

Qualitative bond relationship based on Micro-Blade 2018; no numeric hardness or wear unit.

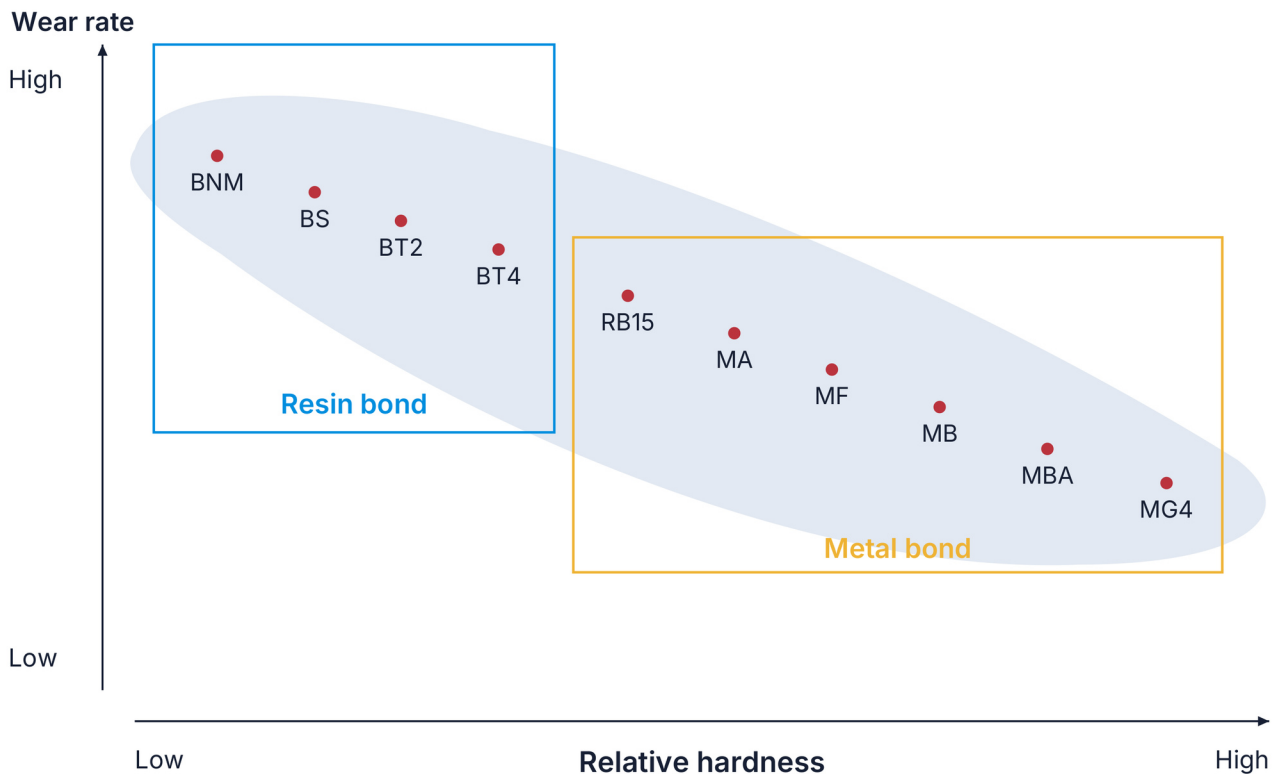
Microblades: wear rate and relative hardness



Qualitative relationship; the source provides no numeric axis values.

Qualitative bond relationship based on Micro-Blade; no numeric hardness or wear unit.

Microblades: wear rate and relative hardness



Qualitative relationship; the source provides no numeric axis values.

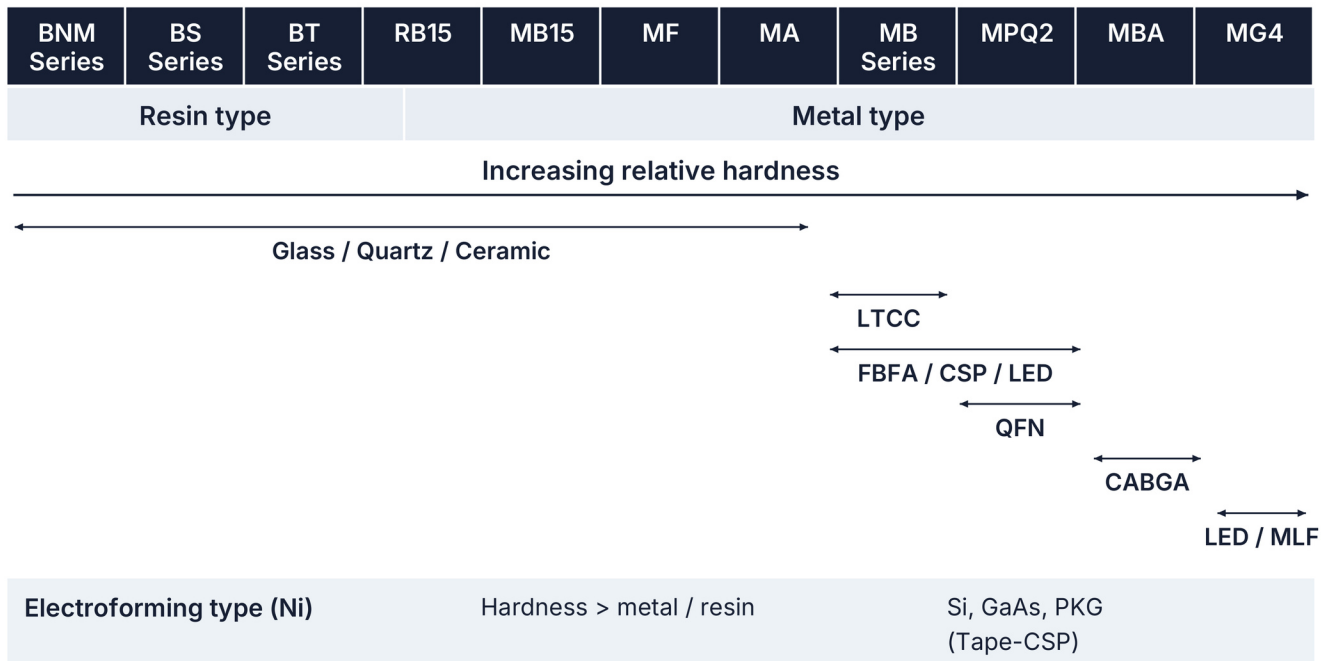
Qualitative bond relationship based on Micro-Blade 2018 New; no numeric hardness or wear unit.

Blade structure and application ranges

The selection matrix arranges BNM Series, BS Series, BT Series, RB15, MB15, MF, MA, MB Series, MPQ2, MBA and MG4 along increasing relative hardness. Application arrows indicate ranges within these series. The boundary between resin and metal lies within the RB15 column in the illustration, so the graphic should be read as a range relationship.

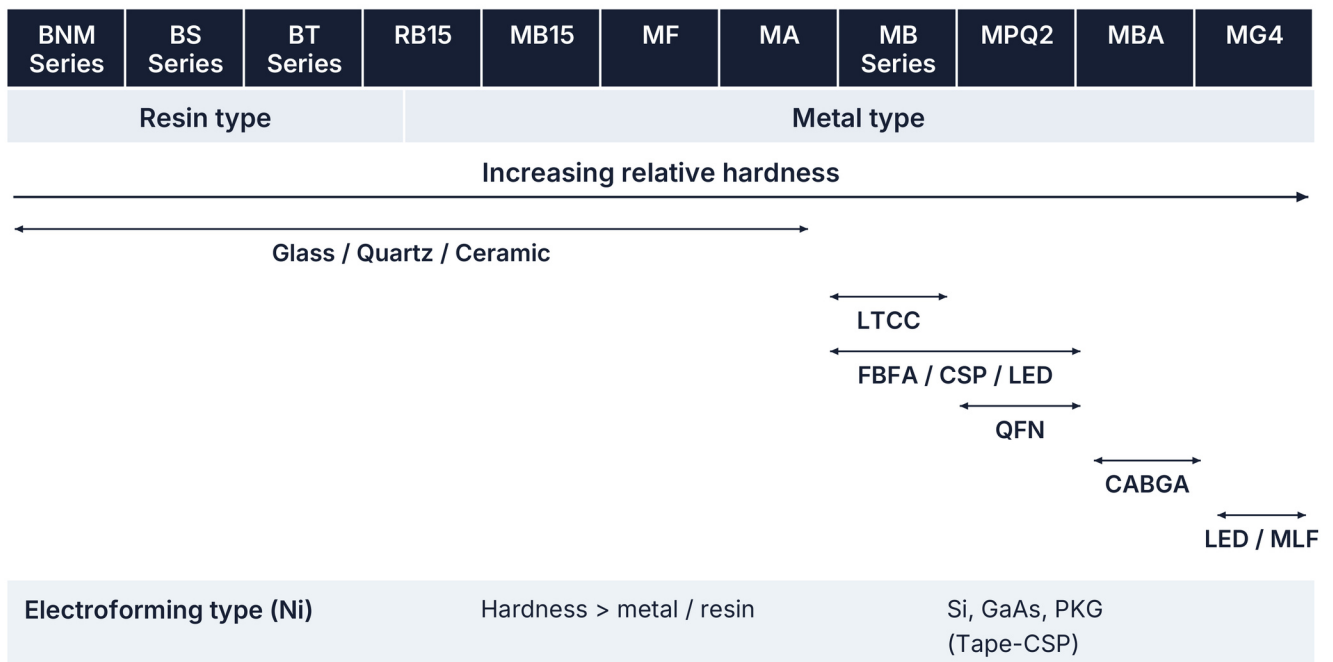
Application fields include glass, quartz and ceramic, LTCC, FBFA/CSP/LED, QFN, CABGA and LED/MLF. The electroformed structure uses metal (Ni); the matrix describes its hardness as higher than that of metal- and resin-bonded blades. Si, GaAs and PKG (Tape-CSP) cutting are listed as applications.

Microblades: relative hardness and application ranges



Selection matrix based on Micro-Blade 2018: original arrow spans and boundary within RB15 retained.

Microblades: relative hardness and application ranges



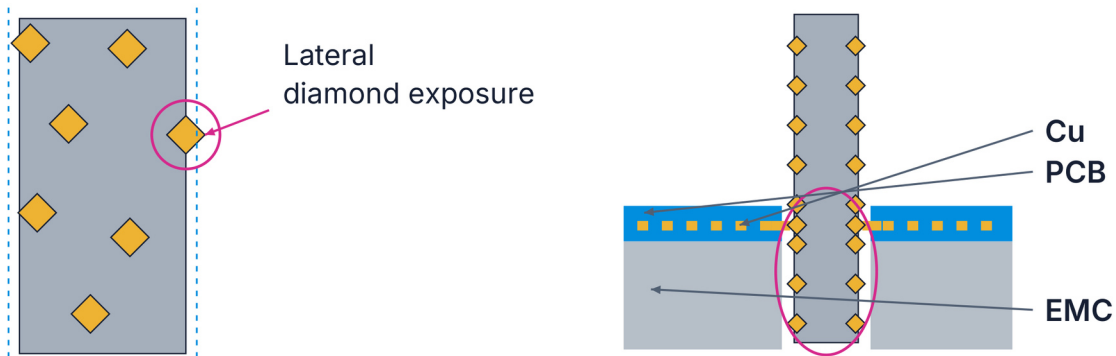
Selection matrix based on Micro-Blade 2018 New: original arrow spans and boundary within RB15 retained.

Blade surface and lateral diamond exposure

The new blade surface is designed so that diamonds do not protrude laterally beyond the blade face in the illustrated structure. The targets are better cut quality in terms of copper burrs and chipping, together with stable cut geometry. EHWA also describes longer blade life and greater hardness than the compared conventional design.

In the contact schematic, laterally exposed diamond can interfere with copper wiring in the PCB layer; the EMC layer lies below it. The new design avoids that contact in the illustrated structure. Cutting diamonds remain part of the tool.

Conventional blade side

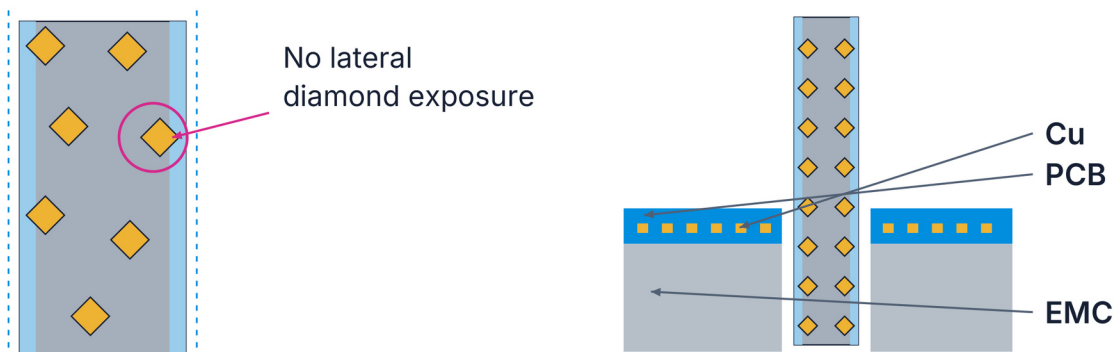


Schematic illustration

Possible copper-wiring interference
in the illustrated structure

Conventional blade side and possible copper-wiring interference, schematic based on Micro-Blade 2018.

New blade side

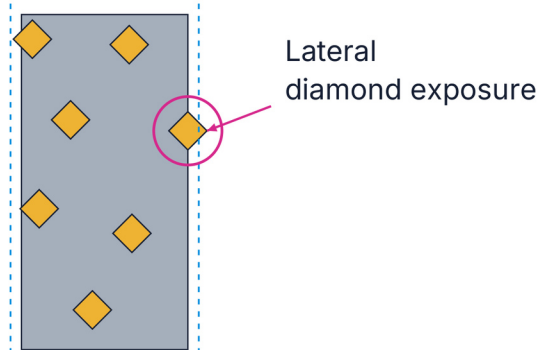


Schematic illustration

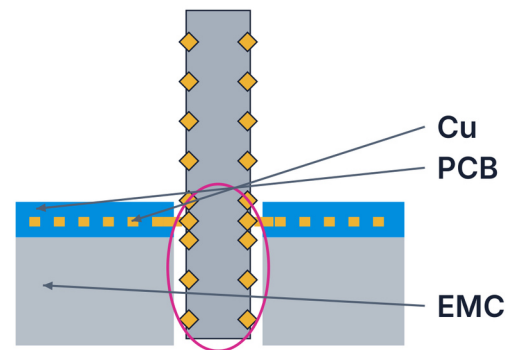
No copper-wiring interference
in the illustrated structure

New blade side without lateral diamond exposure in the illustrated PCB/Cu/EMC structure, schematic based on Micro-Blade 2018.

Conventional blade side



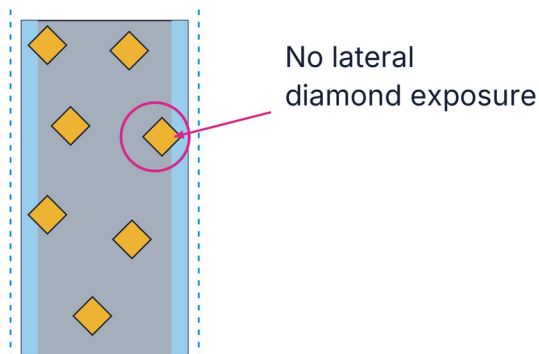
Schematic illustration



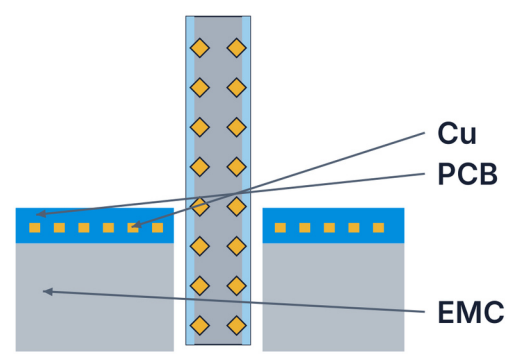
Possible copper-wiring interference
in the illustrated structure

Conventional blade side and possible copper-wiring interference, schematic based on Micro-Blade 2018 New.

New blade side



Schematic illustration



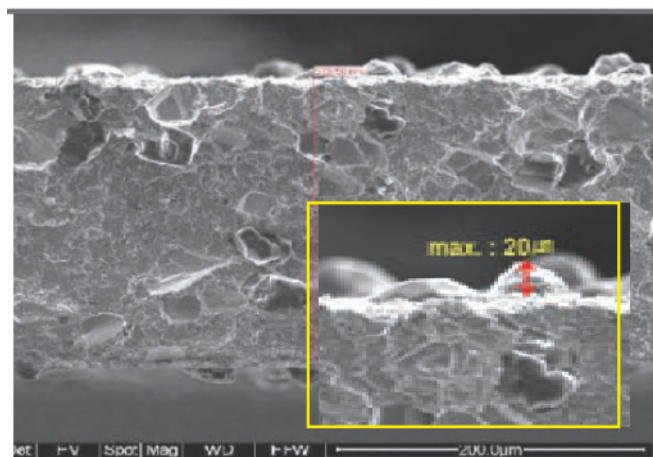
No copper-wiring interference
in the illustrated structure

New blade side without lateral diamond exposure in the illustrated PCB/Cu/EMC structure, schematic based on Micro-Blade 2018 New.

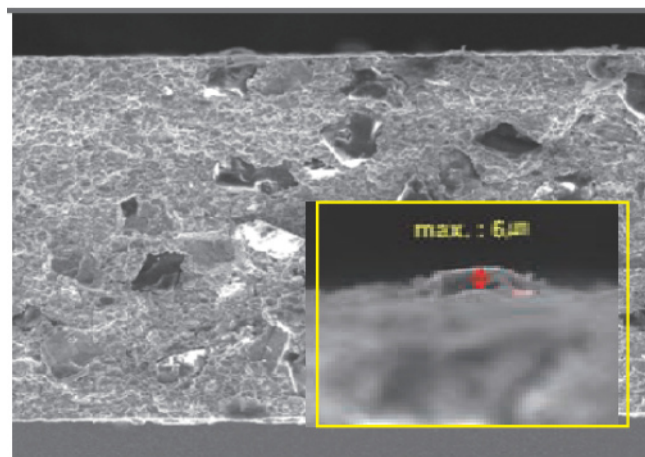
Surface and shape comparisons

The SEM images show the conventional and new blade surfaces with an enlarged edge region. Micro-Blade 2018 and Micro-Blade 2018 New report a maximum of 20 μm for the conventional and 6 μm for the new design. Micro-Blade reports 20 μm and 3 μm in its separate image comparison. These image measurements belong to different product editions.

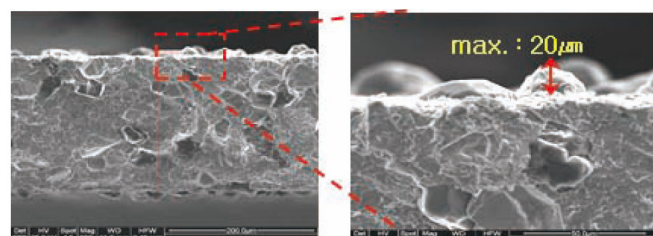
Product edition	Conventional design	New design
Micro-Blade 2018	max. 20 μm	max. 6 μm
Micro-Blade	max. 20 μm	max. 3 μm
Micro-Blade 2018 New	max. 20 μm	max. 6 μm



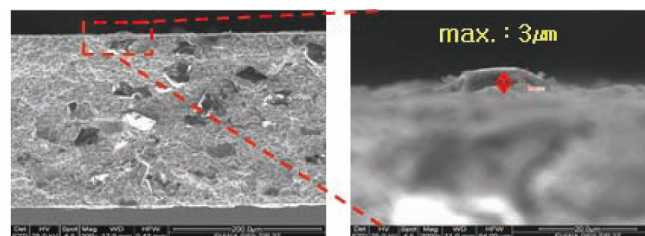
Conventional blade surface, Micro-Blade 2018: maximum 20 μm . Original measurement, enlargement and scales are retained.



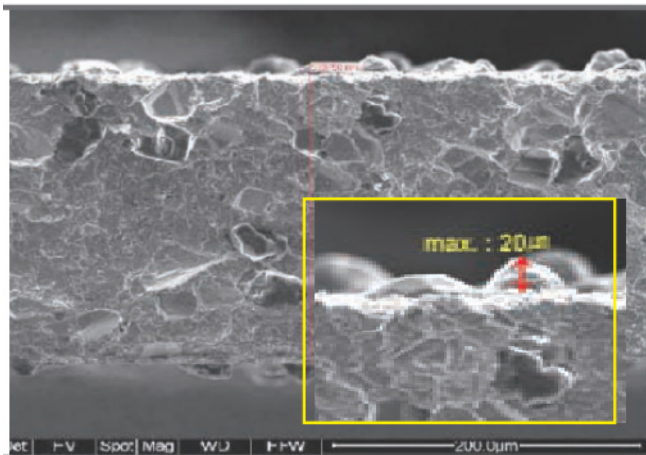
New blade surface, Micro-Blade 2018: maximum 6 μm . Original measurement, enlargement and scales are retained.



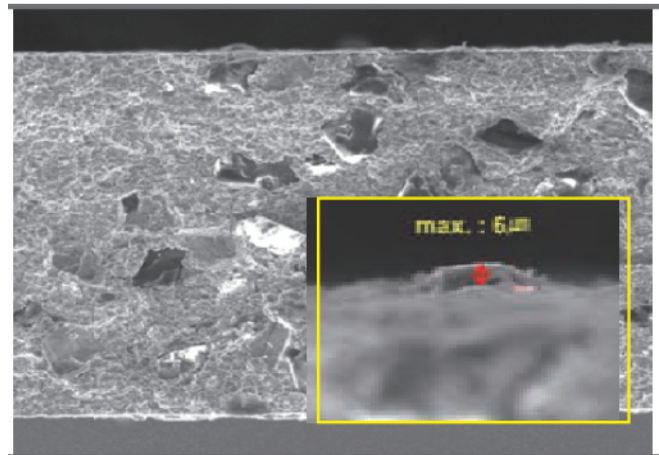
Conventional blade surface, Micro-Blade: maximum 20 μm . Original measurement, enlargement and scales are retained.



New blade surface, Micro-Blade: maximum 3 μm . Original measurement, enlargement and scales are retained.

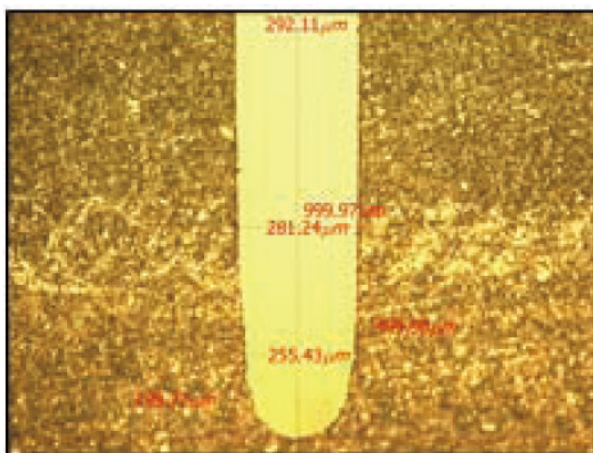


Conventional blade surface, Micro-Blade 2018 New: maximum 20 µm. Original measurement, enlargement and scales are retained.

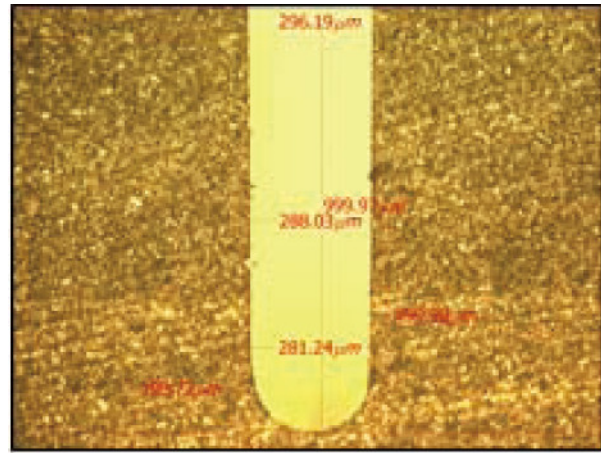


New blade surface, Micro-Blade 2018 New: maximum 6 µm. Original measurement, enlargement and scales are retained.

Micro-Blade supplements the surface comparison with optical images of the resulting groove. The original images retain all dimension lines and displayed measurements. Readable width values include 292.11, 281.24 and 255.43 µm in the conventional image, and 296.19, 298.03 and 281.24 µm in the image of the new design.



Groove shape of the conventional design with the complete original measurement annotations.



Groove shape of the new design with the complete original measurement annotations.

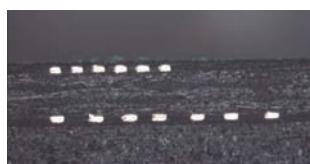
Package cut quality and blade comparison

The package images compare conventional and improved cut quality. The associated blade comparison gives the following wear-rate and bending-force values. The sources provide no unit or complete trial conditions for these quantities; the numbers describe this comparison.

Design	Wear rate	Bending force
Conventional	100	100
New type	75	145

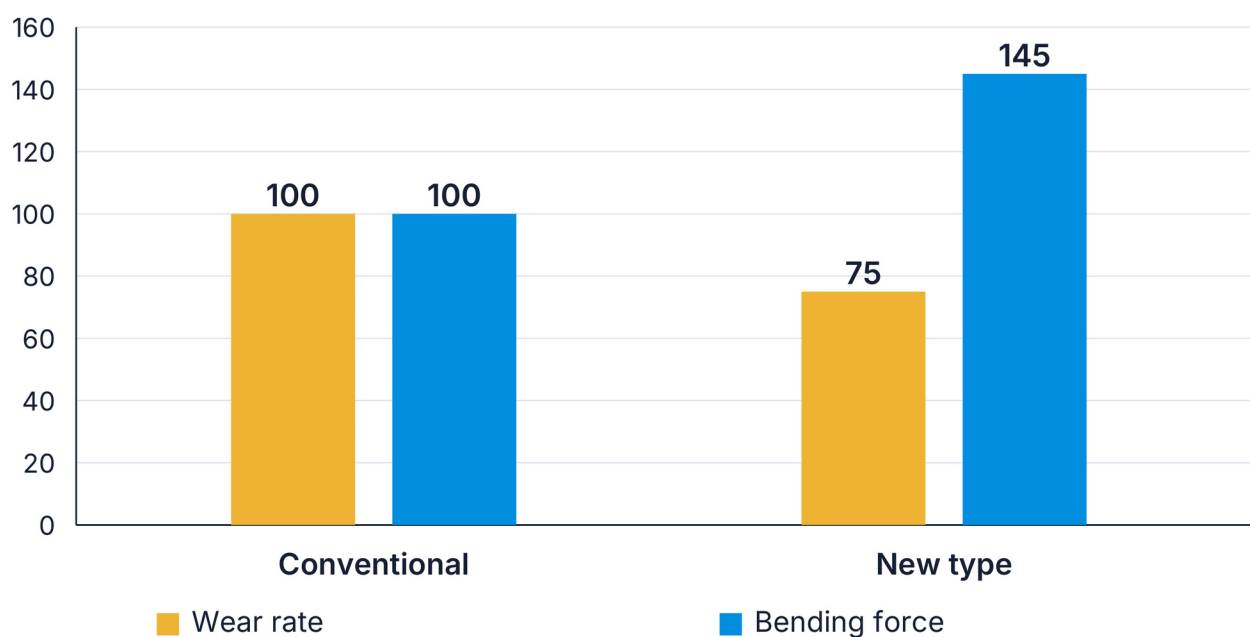


Conventional package cut quality, original image from Micro-Blade 2018.



Improved package cut quality, original image from Micro-Blade 2018.

Microblades: wear-rate and bending-force comparison



Source comparison values; no unit specified.

Comparison based on Micro-Blade 2018: wear rate 100/75 and bending force 100/145; axis 0-160.

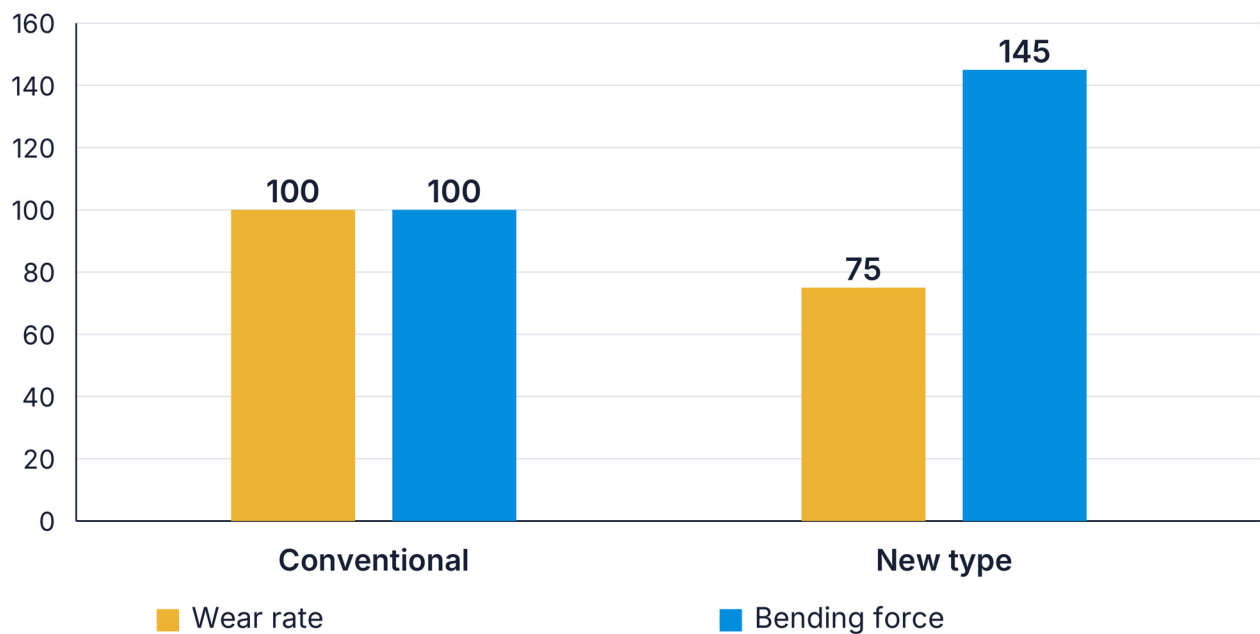


Conventional package cut quality, original image from Micro-Blade.



Improved package cut quality, original image from Micro-Blade.

Microblades: wear-rate and bending-force comparison

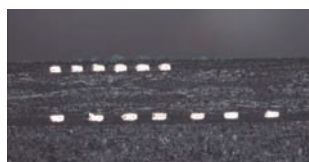


Source comparison values; no unit specified.

Comparison based on Micro-Blade: wear rate 100/75 and bending force 100/145; axis 0-160.

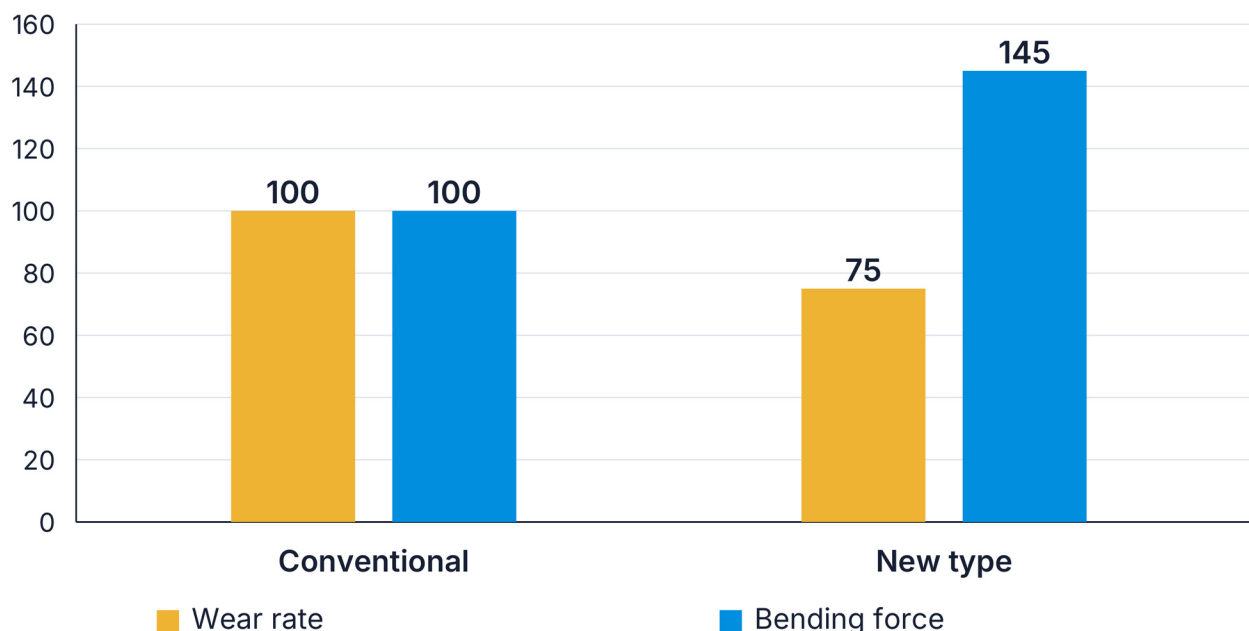


Conventional package cut quality, original image from Micro-Blade 2018 New.



Improved package cut quality, original image from Micro-Blade 2018 New.

Microblades: wear-rate and bending-force comparison



Source comparison values; no unit specified.

Comparison based on Micro-Blade 2018 New: wear rate 100/75 and bending force 100/145; axis 0-160.

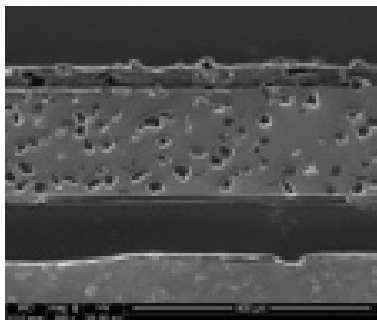
Electroformed microblades

Electroformed nickel-bonded microblades combine high accuracy with a very thin, free-standing design. The product sheet describes a thickness of approximately 50 µm compared with more than 100 µm for metal-bonded microblades. Its specification also lists a blade thickness greater than 50 µm. The specific available design is determined for the application.

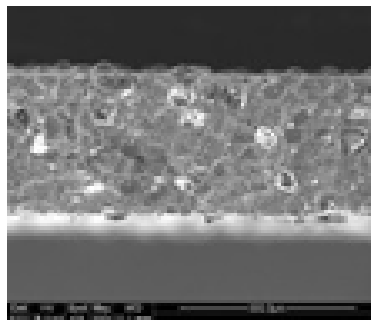
High bond retention strength supports long blade life. EHWA characterises the nickel-bond microstructure of this product development as pore-free. The design addresses hard materials, including ceramic LTCC and HTCC packages, and packages with a high abrasive content. High yield and long blade life are the described application benefits.

Specification	Value
Blade thickness	>50 µm
Outer diameter	>54 mm
Diamond concentration	25-100 con

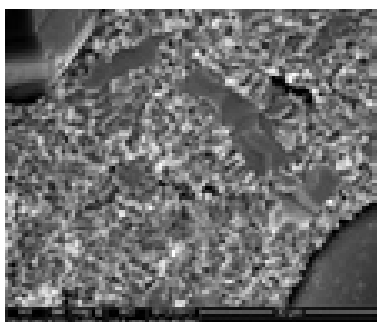
"con" is the concentration notation used in the product sheet; it is not identified as a percentage.



Electroformed microblade, left microstructure image, SEM
×200.



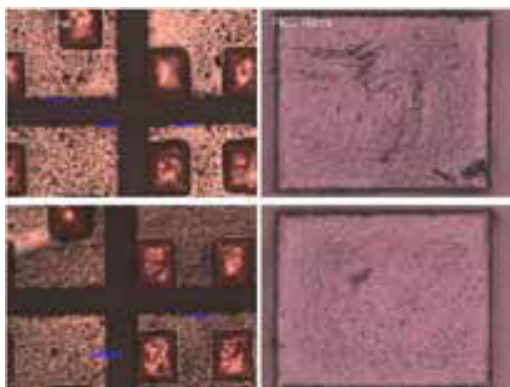
Electroformed microblade, right microstructure group, SEM
×200.



Electroformed microblade, right microstructure group, SEM
×2000.

Electroformed microblades in package cutting

The applications combine a thin kerf with long blade life: ceramic HTCC and LTCC packages, LED packages, PCBs and other suitable components. The illustrated ceramic-package example reports chipping sizes of 10-20 μm with a maximum of 27 μm . Blade and machine parameters for this example are not specified.



Four original images of the ceramic-package example: chipping 10-20 μm , maximum 27 μm .

Blade selection for your cut

For blade selection, we need the material and layer structure, component or wafer thickness, required kerf, top- and backside quality requirements, machine model, hub or flange interface, and spindle speed, feed and coolant conditions. For metal-containing packages, wiring structure, copper burrs and shape retention are particularly relevant. Existing cut images and blade-life data help compare suitable bond and grit variants.

Contact EHWA Europe: info@ehwadia.de · +49 6173 997780.

Product references

Product information is based on the complete EHWA editions Dicing (5.dicing), p. 1; Micro-Blade 2018, pp. 1-2; Micro-Blade, pp. 1-2; Dicing Blade, p. 1; Electroformed Micro Blade New, pp. 1-2; Micro-Blade 2018 New, pp. 1-2; and Dicing Blade New, p. 1. Matching minimum thicknesses and comparison values are consolidated; differing measurement images and all image variants remain attributed.

The context for backside chipping additionally considers [DISCO: Dicing of thin wafers](#). The editorial date identifies the preparation of this edition, rather than the manufacturing year of the blades.