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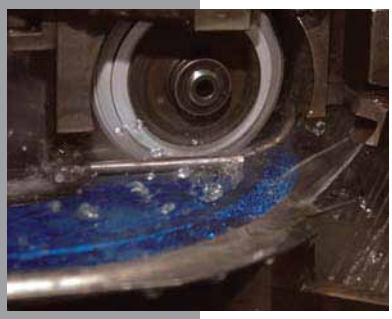
Dicing Products

Blades and Services for Advanced Material Application

Kulicke & Soffa

Kulicke & Soffa®



Dicing Products

Hub Blades and Services for Advanced Material Applications

In the last two years, the implementation of new and significant quality improvement processes, combined with the addition of talented and experienced personnel in key positions within our organization, has bolstered our commitment to, both, meeting and exceeding your hub blade requirements.

Our new Dicing Products Catalog of Hub Blades and Services is just one more step in providing a complete and comprehensive solution to your dicing needs. In addition to outlining our diverse product range and extended technical capabilities, the catalog provides detailed information about a variety of blade attributes, general dicing technology, and additional resources that will assist you in selecting the right hub blade for your specific applications….much faster and much easier than ever before.

Supported by our vast network of global resources and industry-leading expertise in all phases of back end semiconductor packaging and assembly, our Hub Blade organization is structured to help you, in every way, improve yields, increase your productivity and attain higher profitability.

A Tradition In Technology

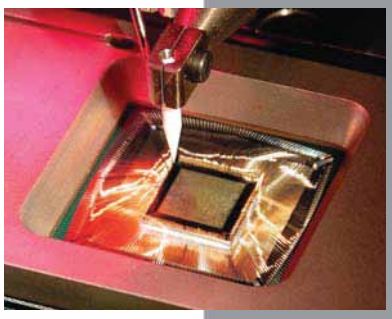
Since it's founding in 1951 by Fred Kulicke and Albert Soffa, Kulicke & Soffa has played a key role in the ever-changing technological arena. During its first few years, the company engineered large-scale machinery, but by the mid-1950s it had entered the semiconductor industry, specializing in total solutions engineering.

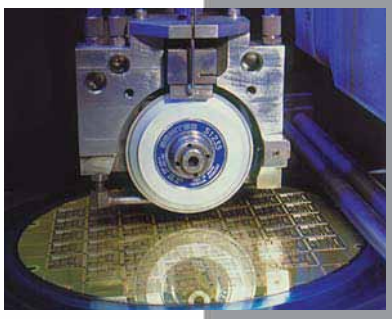
Today, K&S is a global leader in semiconductor packaging technology with a leading market share in IC Ball bonders and ever increasing shares in a wide range of packaging materials. Additionally, K&S has been expanding in its hub blade technology and now is an industry-leading, worldwide supplier of hub dicing wheels.

The company continues to expand its capital equipment offerings to provide further growth and to offer its customers a broader range of products with improved customer support.

The company has made a strategic decision in developing state-of-the art manufacturing facilities, providing faster delivery and focusing on continuous improvement; a philosophy that has consistently yielded better quality and greater customer satisfaction.

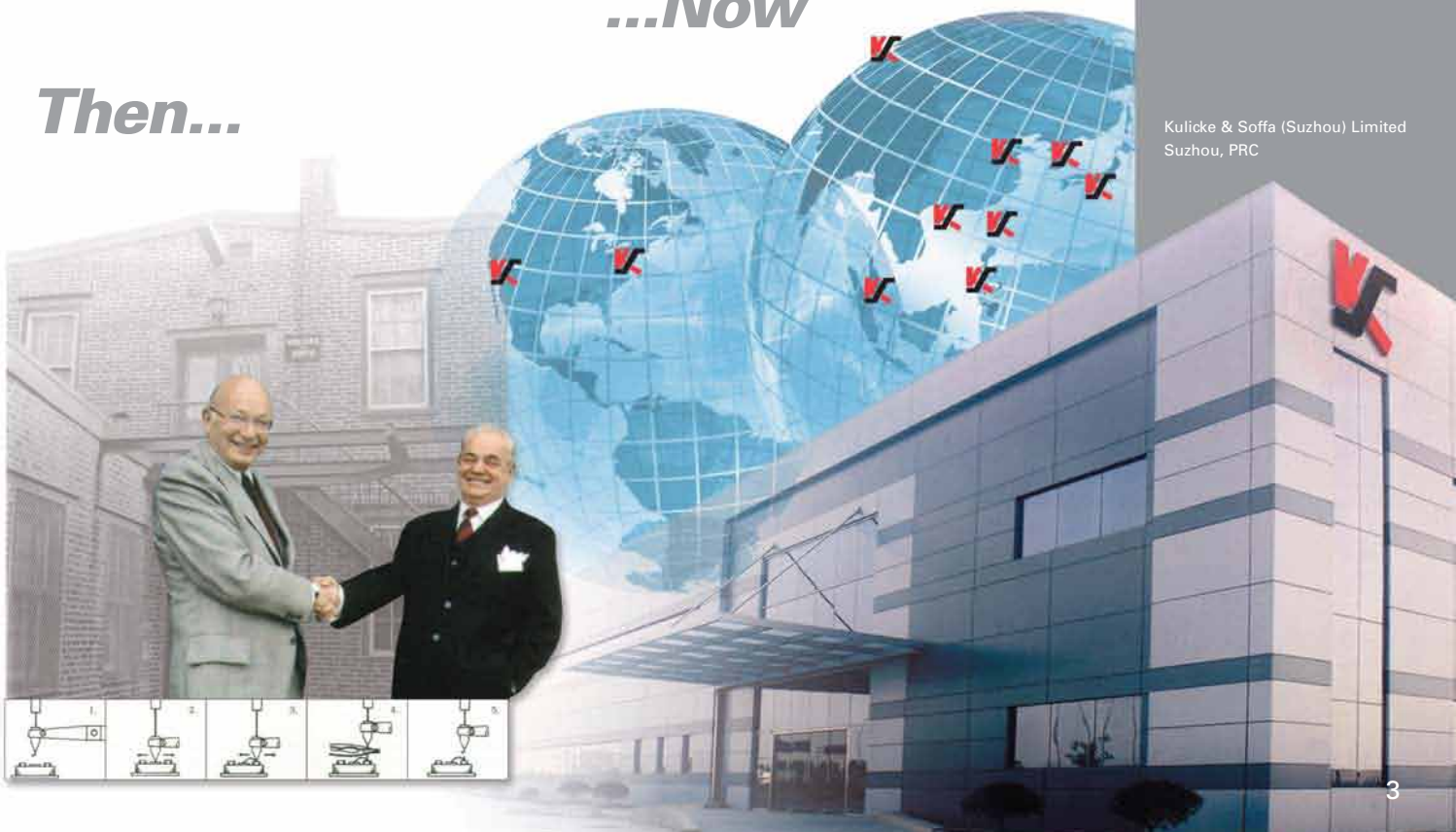
These factors, combined with dynamic, forward-thinking leadership, multi-talented management, and a diligent skilled workforce, has made Kulicke & Soffa a true, complete connection in the global semiconductor industry.





...Now

Then...



Kulicke & Soffa (Suzhou) Limited
Suzhou, PRC

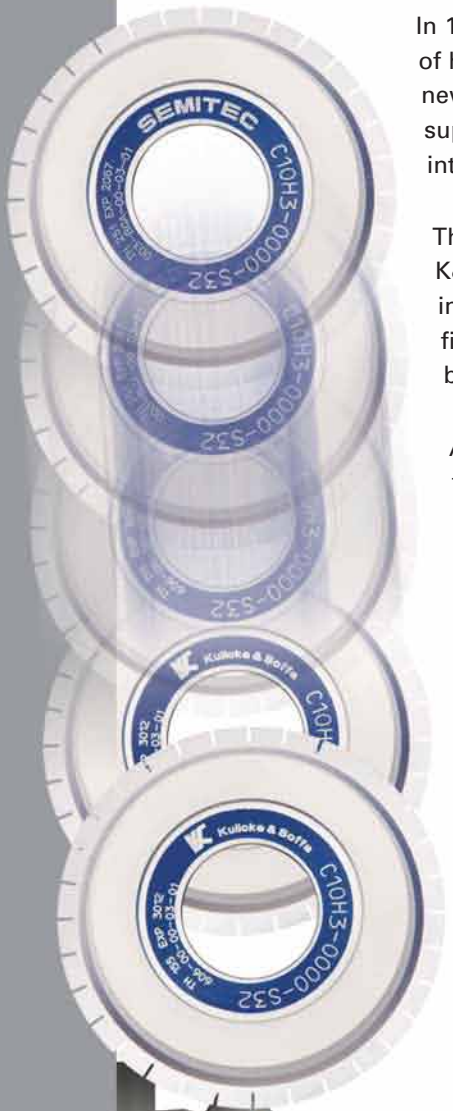
A Strong History in Blade Technology

In 1996, Kulicke & Soffa acquired Semitec, a California-based supplier of a wide range of hub blades for automatic dicing saws, as part of Scott Kulicke's plan for creating a new strategic direction for the company. By increasing the company's ability to supply all types of semiconductor consumable products, K&S could offer more integrated, total solutions that would improve our customers' productivity.

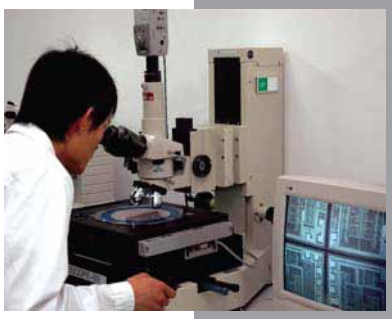
This acquisition, combined with the existing line of dicing systems equipment and K&S' position as a global leader in semiconductor packaging technology, immediately established K&S as a major force in the dicing industry. Over the next five years, the dicing group continued to grow, along with the wire bonding business units.

After 2000, K&S made some early strategic plans to moves its blade manufacturing facility to China, a move that would reduce manufacturing costs and increase value for existing customers throughout North America, Europe, and Asia, while bringing our dicing products closer to new and rapidly emerging markets.

Today, K&S blades have replaced the Semitec brands, but the rich blade history remains strong. Customers around the globe have seen first hand the growth in our dicing blade manufacturing and engineering capability.

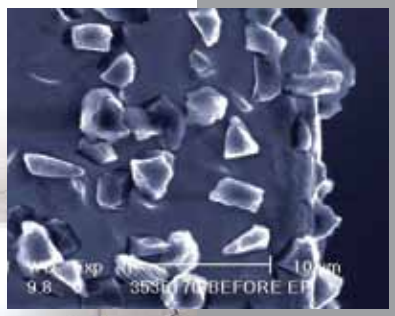


Research & Development



To maintain an emerging leadership position in the hub blades market segment, Kulicke & Soffa (K&S) has made significant investments into major Research and Development engineering programs. In addition to generating higher product productivity for the complete range of our blade products, these capital and personnel investments have helped our global customers to produce excellent process results using our superior cutting and longer life blades.

K&S has developed and implemented a three-part strategy in blade research. First, our R&D programs continue to improve the state-of-the-art in dicing quality and efficiency by analyzing and solving common inconsistencies our customers encounter in the dicing process and their root causes. Second is our goal to continually improve our existing product by examining new materials and manufacturing processes that will help us maintain our competitive edge. Third, we're focused on new product development, with an expansion into key market applications. These three critical R&D areas are supported by a talented group of scientists and engineers who are completely dedicated to blade research. Our core team of experts includes renowned specialists in mechanical, materials, and chemical engineering.

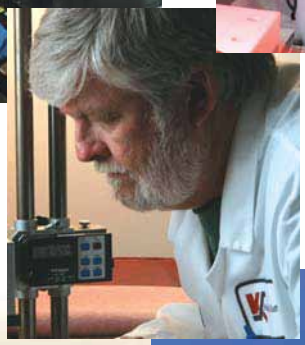


In addition to our team, K&S has invested in tools, equipment, and technology and has established a major R&D center in Suzhou, PRC. Using the best metrology and analysis equipment in the industry, K&S can produce higher yields and superior products. We have capability for analysis using SEM, EDX, HPLC and micro hardness systems for superior analysis and faster development.

Global Applications / Tech Support

Backed by the resources and expertise of the world leader in semiconductor interconnection and packaging technology, the K&S hub blade group is plugged in to a vast wealth of process knowhow and a product support network with key technical centers located strategically around the world. The combined strengths of the organization allow K&S to offer a true total solutions approach to all your hub blade dicing needs.

K&S' state-of-the-art dicing lab in Suzhou is fully outfitted to perform thorough testing and to provide blade and process parameter recommendations for the most challenging applications. SEM and EDX analysis provides insight into blade loading effects, diamond distribution and materials compatibility. We offer quarterly training and seminars on demand, and can also provide on-site application support using the latest DOE methods.

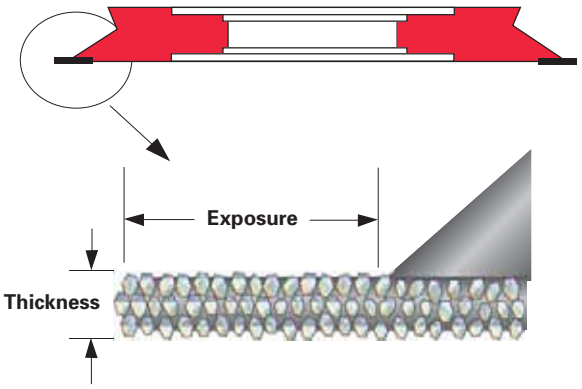


Hub Blade Selection

The five primary parameters to consider when selecting a hub blade are:

- ***Blade Exposure***
- ***Blade Thickness***
- ***Diamond Grit Size***
- ***Nickel Bond Hardness***
- ***Diamond Concentration***

On the next few pages, we've provided some general guidelines for determining these parameters, based on your particular application, and then selecting the hub blades that match those specifications.



Blade Exposure

Selecting the proper blade exposure (*see figure above right*) is a function of the total cut depth. In most applications, the total cut depth refers to the sum of the wafer thickness and the depth of the cut into the tape, although in some cases a user may not wish to cut completely through the wafer material. Proper exposure extends blade life and aids cut quality and kerf width. Excessive exposure contributes to blade wobble, resulting in wider kerf, increased blade wear and reduced cut quality. The chart at right provides some general blade exposure recommendations based on the thickness of the material to be cut.

Blade Exposure Recommendations

WAFER THICKNESS		BLADE EXPOSURE	
microns	mils	microns	mils
< 254	< 10	380 - 510	15 - 20
254 - 330	10 - 13	510 - 640	20 - 25
330 - 432	13 - 17	640 - 760	25 - 30
432 - 533	17 - 21	760 - 890	30 - 35
533 - 635	21 - 25	890 - 1020	35 - 40
635 - 762	25 - 30	1020 - 1140	40 - 45

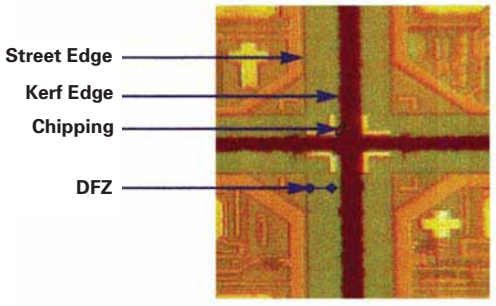
Based on 10 mils (254 microns) of wear

Blade Thickness

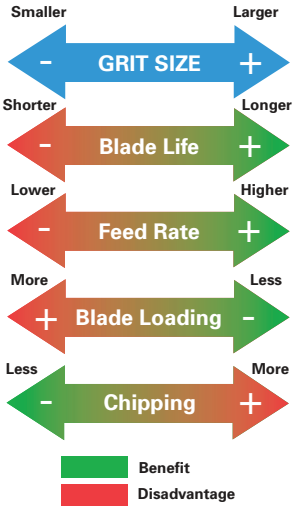
Blade thickness should be based on the street width and the required Defect Free Zone (*see figure below*). The Defect Free Zone (DFZ) is the distance from the edge of the street toward the kerf, within which chipping, cracking or other defects are not acceptable. The proper blade thickness is essential in providing the desired kerf width and to ensure that the desired DFZ is maintained. The chart at right provides some general blade thickness recommendations based on the street width of the wafer to be cut.

Blade Thickness Recommendations

STREET WIDTH		BLADE THICKNESS	
microns	mils	microns	mils
50	2.0	15 - 20	0.6 - 0.8
50 - 64	2.0 - 2.5	15 - 20	0.8 - 1.0
64-76	2.5 - 3.0	20 - 25	1.0 - 1.2
76-89	3.0 - 3.5	25 - 30	1.2 - 1.4
89-102	3.5 - 4.0	35 - 41	1.4 - 1.6
102-127	4.0 - 5.0	41 - 51	1.6 - 2.0
127-152	5.0 - 6.0	51 - 64	2.0 - 2.5

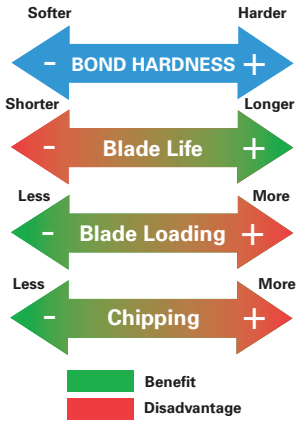


Hub Blade Selection



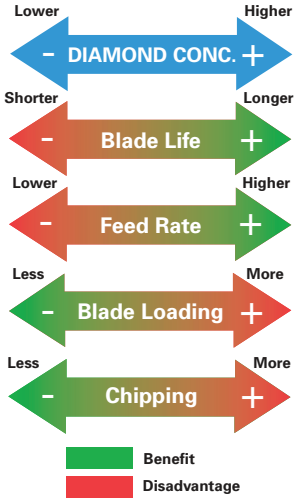
Diamond Grit Size

Selection of the proper diamond grit size is also critical to cut quality, feed rate, RPM and wheel life. In general, blades with small diamond grit provide smoother cuts. Smaller diamonds are also released from the bond more readily, exposing new sharp diamonds and helping to maintain exceptional cut quality. The blade's capacity for releasing diamond grit, however, is also a function of the bond hardness and therefore cannot be evaluated alone. When a smaller grit size is used, the diamond particles are normally less spread apart, making the blade more susceptible to loading. This characteristic is also a function of the diamond concentration. In addition, small diamond particles remove less material, and may necessitate a higher spindle RPM and slower feed rates. Larger diamonds, by comparison, are released less readily and provide longer blade life, but overall tend to provide rougher cuts with a greater propensity for chipping. When used in the proper application however, they remove more material, handle higher feed rates, and resist wheel loading. Blades with larger diamond grit also tend to be more rigid than blades with smaller diamonds and are more resistant to wobble and vibration.



Bond Hardness

Bond hardness is directly related to a blade's ability to release diamond grit, exposing new diamonds for the maintenance of cut quality. The softer the bond, the more readily this occurs, albeit at the expense of wheel life. Wheel life can be extended, however, by reducing feed rate and overall friction. Wheels with softer bonds also display superior resistance to loading. Wheels with harder bonds are more resistant to wear as particles are retained longer, however, these wheels are less resistant to loading and are more likely to cause back-side chipping as sharp diamond grit is less frequently exposed.



Diamond Concentration

Diamond concentration affects cut quality, feed rate and wheel life, similar to grit size and bond hardness. As mentioned above, none of these factors can be determined without giving consideration to the others, however, diamond concentration is most critical when wheel loading is of major concern and quality concerns prevent the use of a larger diamond grit size. Low diamond concentrations resist wheel loading since the diamond particles are spaced farther apart, resulting in improved cut quality in the most critical applications. The disadvantage of a low diamond concentration is that each diamond must remove more material, reducing wheel life and demanding slower feed rates.

For additional information concerning your dicing application and hub blade selection, please contact your local K&S dicing representative.

Hub Blade Applications Guide*

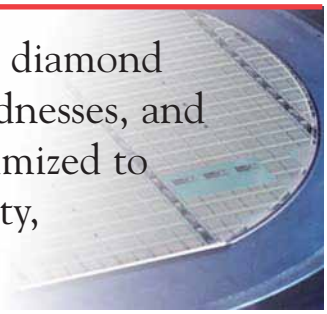
		Blade Series				Grit Size (µm)				
Materials	**Applications**	**Si**	**Cu**	**Nova**	**Enduro**	**2 - 4**	**4 - 6**	**4 - 8**	**30**	**50**
Alumina	CBGA, Ceramic Pkg				●				●	
BGA	Mold Compound				●					●
$Bi_{12}SiO_{20}$	Thin Films	●						●		
Bi_2TeO_5	Thin Films				●					
Cu	Copper Metallized Wafers		●							
CVD	Low-k, Multi-Layer			●						
Epoxy	Molding Compounds				●					●
Ferrite	Tape Heads							●		
FR4	PCB, CSP, PBGA				●					●
Glass	Ink Jet Print Heads				●				●	
Kovar	Hermetically-Sealed IC, Discrete				●					
$LiNbO_3$	SAW Devices							●		
LiTa	SAW Devices							●		
PZT	Sensors						●	●		
Quartz	SAW Devices				●					
Si	Discrete, IC, Memory	●				●	●	●		
Si (Passivated)	Sensors, Photocells				●					
SiC	LED, Discrete, Opto	●				●	●			
SiGe	LED, Discrete, Opto	●				●				
SOG	Spin On Glass	●						●		
Spin On	Low-k, Multi-Layer			●						
TiC	Magnetic Heads						●	●		

Silicon

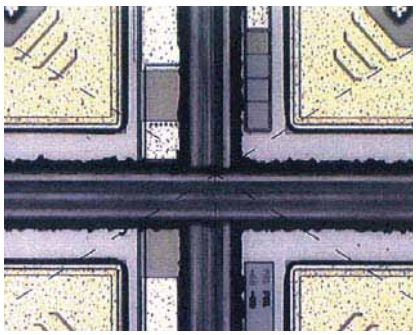
Hub Blades for

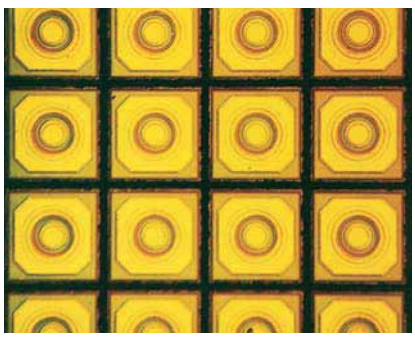
Silicon Wafer Dicing

A full range of grit sizes, diamond concentrations, bond hardnesses, and hub configurations are optimized to deliver maximum cut quality, throughput and blade life.



- ***Available in 0.6 mil to 5.0 mil Thicknesses***
- ***Exposures of 15 mil to 60 mil***
- ***2-4 µm to 4-8 µm Diamond Grit***
- ***Choice of 3 Different Bond Hardnesses***
- ***Choice of 3 Diamond Concentrations***
- ***Available in AccuCut or Standard Hub, Both with AccuKerf Feature***





For Today's Most Advanced Silicon Dicing Applications

Increased circuit densities, reduced street widths, thinner wafers and the demand for higher throughput, are just a few of the factors that have led IC manufacturers on a quest for improved performance and cut quality when dicing silicon wafers. K&S' proprietary blade manufacturing processes, which allow precise control of diamond grit size, diamond concentration, and nickel bond hardness, are used to optimize these variables and produce hub blades that offer unparalleled cut quality, blade life and throughput.

A Wide Range of Grit Sizes

Small diamond grit is more readily released from the nickel binder, exposing new diamonds to maintain blade sharpness and minimize chipping. Larger diamonds, on the other hand, provide longer life, are more resistant to loading, and allow higher feed rates. Optimum performance is therefore obtained by selecting a grit that best meets your specific criteria for quality versus throughput. K&S' hub blades for silicon wafer dicing are available in a variety of grit sizes, ranging from 2 µm-4 µm to 4 µm-8 µm. Our improved diamond dispersion technology also ensures more uniform distribution of grit grains through the binder material.

Variable Bond Hardness

Soft nickel binder releases diamond grit easily, exposing new sharp diamonds to help maintain cut quality. Softer bonds are also less prone to loading, while harder nickel bonds provide greater resistance to wear. In order to obtain the optimum balance between cut quality and blade life, K&S offers three different grades of bond hardness for silicon wafer dicing applications.

Choose From 3 Different Diamond Concentrations

Diamond concentration is critical when loading is a concern and larger grits are not suitable. Lower concentrations provide greater resistance to wheel loading, while higher concentrations increase blade life and allow higher feed rates. K&S hub blades for silicon wafer dicing are available in three different diamond concentrations to maintain the desired equilibrium between loading, blade life and throughput.

AccuKerf™ Blades

Our AccuKerf™ series of hub blades provide superior kerf control and durability when dicing thick wafers with very narrow streets. Directly replaceable with comparable hub blades from the K&S catalog, AccuKerf blades allow maximization of feed rates and increased productivity.

Blade Dimensions

THICKNESS		EXPOSURE								
	mm	.381-.507	.508-.634	.635-.761	.762-.888	.889-1.015	1.016-1.142	1.143-1.269	1.270-1.396	1.524-1.650
microns	mils	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	60-65
		0615	0620							
15-20	0.6-0.8	0815	0820	0825						
21-25	0.8-1.0	1015	1020	1025	1030					
26-30	1.0-1.2	1215	1220	1225	1230	1235				
31-36	1.2-1.4	1415	1420	1425	1430	1435	1440			
37-41	1.4-1.6	1615	1620	1625	1630	1635	1640	1645		
42-51	1.6-2.0	2015	2020	2025	2030	2035	2040	2045	2050	
52-64	2.0-2.5	2515	2520	2525	2530	2535	2540	2545	2550	
65-76	2.5-3.0	3015	3020	3025	3030	3035	3040	3045	3050	
77-89	3.0-3.5		3520	3525	3530	3535	3540	3545	3550	3560
90-102	3.5-4.0			4025	4030	4035	4040	4045	4050	4060
103-114	4.0-4.5				4530	4535	4540	4545	4550	4560
115-127	4.5-5.0					5035	5040	5045	5050	5060
128-140	5.0-5.5					5535	5540	5545	5550	5560

Part Number Configuration

Example: J1030-Q500-000

This is the part number for a 1.0 mil thick x 30 mil exposure blade with 2-6 µm (J) grit, standard bond hardness (Q), standard diamond concentration (5), an AccuCut hub (00), and no customization (000).

J 1030 - Q 5 00 - 000

These final three digits are used to designate a code that identifies a customized blade configuration or formulation for a special requirement.

Grit Size

K&S hub blades for silicon dicing applications are available with diamond grit sizes in the following ranges:

G*, F	2-4 µm
J*, K	2-6 µm
Q*, S	4-6 µm
U	4-8 µm

* G, J, and Q ranges designate the use of our improved diamond dispersion technology in the manufacturing process.

Bond Hardness

Hub blades for silicon dicing applications are available in the following bond hardness:

E	Soft
Q	Standard
V	Hard

Hub Configuration

Blades for silicon dicing are available with standard or AccuCut hubs (both with or without the AccuKerf feature) and are designated as follows:

00	AccuCut
H0	AccuCut w/ AccuKerf
SH	Standard Hub
HH	Standard Hub w/ AccuKerf

Blade Dimensions

Hub blades for silicon dicing are offered in thicknesses and exposures to suit a wide range of street widths and required cut depths. The first two digits of each four-digit dimension code represent the maximum blade thickness in tenths of mils. The last two digits represent the minimum blade exposure in mils. Therefore, in the example above, the blade dimension code "1030" designates a blade with a maximum thickness of 1.0 mil (0.8 mil minimum) and a minimum exposure of 30 mils (35 mil maximum).

Grit Concentration

K&S offers hub blades for silicon dicing in the following diamond concentrations:

2	Super Low
3	Low
5	Standard

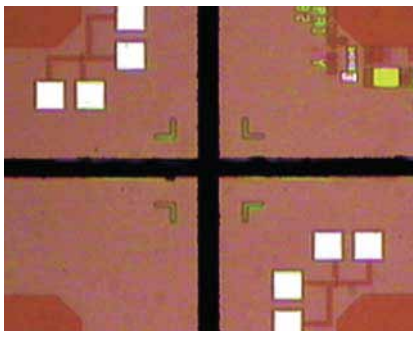
Copper™

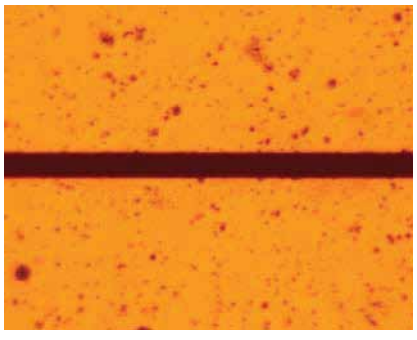
Hub Blades for

Copper Wafer Dicing

Specially-formulated to resist loading when cutting copper-metallized wafers, the new CU Series hub blades reduce top and back side chipping.

- ***Available in 0.6 mil to 5.0 mil Thicknesses***
- ***Exposures of 15 mil to 60 mil***
- ***2-6 µm to 4-8 µm Diamond Grit***
- ***Specially-Formulated 'CU' Series Bond Hardness and Grit Concentration***
- ***Available in AccuCut or Standard Hub, Both with AccuKerf Feature***





A Proven, Tested Solution for Copper Wafer Dicing

Advantages such as superior electromigration properties and the potential for significantly lower fabrication costs have led many IC manufacturers to utilize copper metallization in semiconductor micro-circuitry, despite the numerous challenges posed by this new technology. One such challenge posed to back-end assemblers is that, when dicing copper-metallized wafers, the increased chemical affinity between copper metallization and the nickel-based blade binder material can cause excessive blade loading. Traditional blade formulas and process parameters must therefore be modified to prevent blade loading which, in turn, will reduce the potential for top and back side wafer chipping. K&S has responded to this challenge with the new CU Series of hub blades, specially-formulated and optimized for superior accuracy, throughput and blade life when dicing copper-metallized wafers.

CU Series Blade Formula Prevents Excessive Loading

When loading occurs, the blade's ability to release grit and to expose new diamond particles is dramatically reduced. Blade loading also causes an undo amount of friction in the kerf area, between the blade and the workpiece, which is usually a leading cause of both top and back side chipping. The new CU Series blades utilize a special binder formula, diamond grit concentration, and range of grit sizes that have been specially optimized to prevent this phenomenon.

K&S Blades and Technology Provide a Total Solution

With an understanding that total solutions involve the proper combination of tools, equipment and technology, K&S has done extensive research to help quantify process parameters that, combined with the proper blade formulation, result in successful dicing of copper-metallized wafers. When used at the recommended spindle speed and feed rate, with the proper dicing equipment, CU Series blades provide results that can meet all criteria for cut quality, throughput and blade life.

Blade Dimensions

THICKNESS		EXPOSURE								
	mm	.381-.507	.508-.634	.635-.761	.762-.888	.889-1.015	1.016-1.142	1.143-1.269	1.270-1.396	1.524-1.650
microns	mils	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	60-65
		0615	0620							
15-20	0.6-0.8	0815	0820	0825						
21-25	0.8-1.0	1015	1020	1025	1030					
26-30	1.0-1.2	1215	1220	1225	1230	1235				
31-36	1.2-1.4	1415	1420	1425	1430	1435	1440			
37-41	1.4-1.6	1615	1620	1625	1630	1635	1640	1645		
42-51	1.6-2.0	2015	2020	2025	2030	2035	2040	2045	2050	
52-64	2.0-2.5	2515	2520	2525	2530	2535	2540	2545	2550	
65-76	2.5-3.0	3015	3020	3025	3030	3035	3040	3045	3050	
77-89	3.0-3.5		3520	3525	3530	3535	3540	3545	3550	3560
90-102	3.5-4.0			4025	4030	4035	4040	4045	4050	4060
103-114	4.0-4.5				4530	4535	4540	4545	4550	4560
115-127	4.5-5.0					5035	5040	5045	5050	5060
128-140	5.0-5.5					5535	5540	5545	5550	5560

Part Number Configuration

Example: Q1230-CU00-000

This is the part number for a 1.2 mil thick x 30 mil exposure blade with 4-6 µm (Q) grit, the special bond hardness and grit concentration for copper wafers (CU), an AccuCut hub (00), and no customization (000).

These final three digits are used to designate a code that identifies a customized blade configuration or formulation for a special requirement.

Q 1230 - CU 00 - 000

Grit Size

K&S hub blades for copper wafer dicing applications are available with diamond grit sizes in the following ranges:

J*	2-6 µm
Q*, S	4-6 µm
U	4-8 µm

* J and Q ranges designate the use of our improved diamond dispersion technology in the manufacturing process.

Bond Hardness & Grit Concentration

Hub blades for copper wafer dicing applications are available only with a specially-formulated bond hardness and diamond grit concentration that is designated as '**CU**'. This unique formula prevents blade loading problems associated with dicing through copper metallization and reduces top and back side wafer chipping.

Hub Configuration

Blades for copper wafer dicing are available with standard or AccuCut hubs (both with or without the AccuKerf feature) and are designated as follows:

00	AccuCut
H0	AccuCut w/ AccuKerf
SH	Standard Hub
HH	Standard Hub w/ AccuKerf

Blade Dimensions

Hub blades for copper wafer dicing are offered in thicknesses and exposures to suit a wide range of street widths and required cut depths. The first two digits of each four-digit dimension code represent the maximum blade thickness in tenths of mils. The last two digits represent the minimum blade exposure in mils. Therefore, in the example above, the blade dimension code "1230" designates a blade with a maximum thickness of 1.2 mil (1.0 mil minimum) and a minimum exposure of 30 mils (35 mil maximum).

Hub Blades for

Dicing Low-k Type Wafers

Nova Hub Blades are an immediate solution to the challenges posed by the dicing of low-k type materials by reducing chipping and delamination.

Developed Specifically for Low-k Wafer Dicing

As product features continue to shrink in size, the need to maintain IC performance is driving a transition to low dielectric constant (k) materials in wafer fabrication. While offering fast electrical signal speed and low power consumption, low-k dielectric materials have a tendency to peel and chip during the dicing process, resulting in product loss. K&S' Nova Series hub blades enables the dicing of various low-k wafers with high yield and good productivity, using current dicing equipment and practices. Without requirements for new technologies, the Nova Series hub blades offer a quick, low-cost turnaround for IC manufacturers when transitioning to low-k wafer dicing, without the expense of purchasing laser dicers.

K&S Nova Hub Blades Increase Yield and Throughput in Low-k Wafer Dicing

By incorporating specific formulations of diamond concentration and nickel bond, the Nova Series hub blades address specific needs of low-k wafers to minimize chipping and delamination during the dicing process. High yields are achieved even when advancing wafers at industry standard feed rates. By using the Nova Series hub blades during low-k wafer dicing, yield is maintained without compensating productivity.

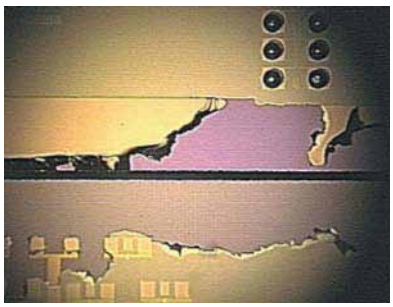
Different Formulations Address Various Low-k Wafer Requirements

As some low-k wafers are more sensitive and difficult to dice than others, K&S offers different formulations of Nova Series hub blades, using standard thicknesses and exposures to meet specific requirements. K&S will assist you in selecting the proper dicing process parameters and Nova hub blade to optimize the results of your application.

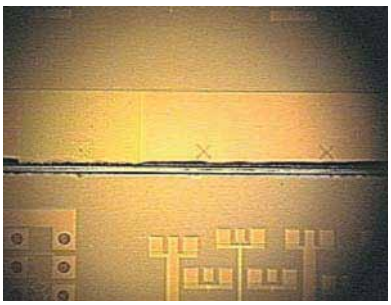
Nova™

- ***Improve Low-k Wafer Dicing Yields***
- ***Immediate Solution Using Current Dicing Practices***
- ***Wide Process Window (Feed Rate & RPM)***
- ***Choice of 3 Standard Bond/Grit Matrices***
- ***Diamond Grit from 2.0-6.0 µm***
- ***Available in 0.8 mil to 2.0 mil Thicknesses***

Low-k layer delamination resulting from the use of a standard blade.



Minimal delamination of low-k layers through the use of the NOVA blade.



Blade Dimensions

THICKNESS		EXPOSURE							
	mm	.381-.507	.508-.634	.635-.761	.762-.888	.889-1.015	1.016-1.142	1.143-1.269	1.270-1.396
microns	mils	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55
		0615	0620						
15-20	0.6-0.8	0815	0820	0825					
21-25	0.8-1.0	1015	1020	1025	1030				
26-30	1.0-1.2	1215	1220	1225	1230	1235			
31-36	1.2-1.4	1415	1420	1425	1430	1435	1440		
37-41	1.4-1.6	1615	1620	1625	1630	1635	1640	1645	
42-51	1.6-2.0	2015	2020	2025	2030	2035	2040	2045	2050

Part Number Configuration

Example: S1435-K200-000

This is the part number for a 1.4 mil thick x 35 mil exposure blade with 4-6 µm (S) grit, the softer bond hardness and grit concentration for low-k wafers (K2), an AccuCut hub (00), and no customization (000).

S 1435 - K2 00 - 000

These final three digits are used to designate a code that identifies a customized blade configuration or formulation for a special requirement.

Grit Size

K&S hub blades for low-k wafer dicing applications are available with diamond grit sizes in the following ranges:

J*	2-6 µm
Q*, S	4-6 µm

* J and Q ranges designate the use of our improved diamond dispersion technology in the manufacturing process.

Bond Hardness & Grit Concentration

Selection of a specific combination (matrix) of a particular bond hardness and grit concentration for low-k wafer dicing is a function of the low-k value, wafer structure (number of low-k layers), and the type of low-k material. K&S offers three standard combinations. These are:

K3	Soft Matrix
K2	Softer Matrix
K1	Softest Matrix

K&S will assist you in selecting the correct matrix for your specific application.

Blade Dimensions

Hub blades for low-k wafer dicing are offered in thicknesses and exposures to suit a range of narrow street widths and required cut depths. The first two digits of each four-digit dimension code represent the maximum blade thickness in tenths of mils. The last two digits represent the minimum blade exposure in mils. Therefore, in the example above, the blade dimension code "1435" designates a blade with a maximum thickness of 1.4 mil (1.2 mil minimum) and a minimum exposure of 35 mils (40 mil maximum).

Hub Configuration

Blades for low-k wafer dicing are available only in the AccuCut hub configuration, designated by the '**00**' code.

Tailored for Quality & Long Life

New Blades for Package Singulation

UniPlus™ series is a breakthrough from traditional package singulation solution, enabling step function improvement on cut quality, precision & productivity with significantly longer blade life. And NOW, the UniPlus™ Hubless is available,enabling ZERO Conversion of your singulation process.

Formulated for Plastic, Ceramic and Composite Package Materials

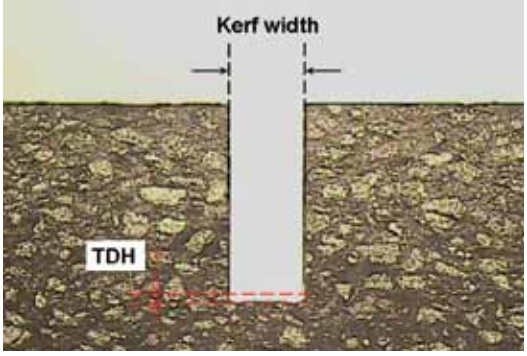
The rapidly growing market of assembly packages that includes plastic, ceramic BGA, CSP and QFN has forced a major quality challenge to the traditional singulation process. A superior cut quality is needed to accommodate perfect package finishing in tight tolerance applications. In order to meet this challenge, K&S has introduced a new series of unique blade specifically designed to provide superior dicing performance, maximizing productivity and longer life span while delivering a lower cost of ownership.

K&S UniPlus™ Blades Tailor Made for BGA, CSP, Ceramic and QFN Packages

The new UniPlus™ blades utilize the unique hub or hubless design, a special nickel bond and a customized blade dimension to enabl optimal performance of singulation. UniPlus™ blades are capable of longer life span, upto 6X of traditional resin bonded blade and upto 2X of metal sintered bonded blade, with minimal kerf change and better control of Tip Deformation Height. Furthermore, UniPlus™ blades reduce machine downtime by reducing blade changeover time, enabling a higher feeding speed which contributes to higher productivity and overall cost reduction.

Highlight Features:

- ✓ Up to 6X longer blade life
- ✓ Hub or Hubless configuration available (ZERO machine conversion)
- ✓ Tailor made for specific application needs
- ✓ 17µm, 20µm, 25µm, 30µm, 40µm, 50µm, 60µm,70µm, diamond grit available for BGA, QFN and Ceramic application
- ✓ 55.6mm,58.0mm, 68.9mm, 76.2mm OD available
- ✓ Optional slits for better heat dissipation



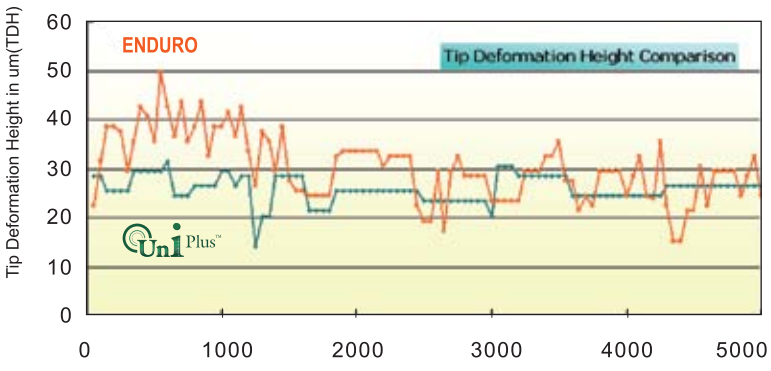
UniPlus Tip Deformation Height in Micron (TDH)

UniPlus™ Design Allow Flexibility to Suit yoour Dicer Configulation

The "plug and play" feature of the UniPlus blades enables the hub or hubless blades to fit into your dicer and RUN with ZERO machine conversion. 55.6mm and 58.0mm blade Outer Diameter (OD) are available for your application needs.

Shorten New Product Development or Evaluation Cycle

The tailor made concept of the UniPlus™ series is also embedded into our evaluation and service processes, K&S will provide free DOE support using our application lab as well as an onsite technical support. These lean technical processes will reduce the sample pick and evaluation cycle time, leading to a significant savings of customers materials and resources.



Blade Dimensions

THICKNESS

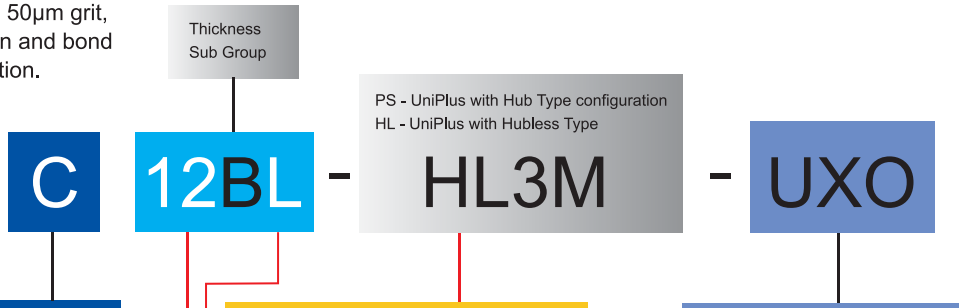
Exposure (For Hub Type Only)

		mm	min	1.016	1.143	1.270	1.397	1.524	1.651	1.778	1.905	2.032	2.159	2.286	2.413	2.540	2.667	2.794	2.921	3.048	3.175	3.302
			max	1.142	1.269	1.396	1.523	1.650	1.777	1.904	2.031	2.158	2.285	2.412	2.539	2.666	2.793	2.920	3.047	3.174	3.301	3.428
Grit size	microns	mils		40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90	90-95	95-100	100-105	105-110	110-115	115-120	120-125	125-130	130-135
A	51-77	2.0-3.0		0340	0345	0350	0355	0360														
A & B	77-102	3.0-4.0		0440	0445	0450	0455	0460	0465	0470	0475	0480	0485	0490								
A, B, E, C, H & D	103-127	4.0-5.0		0540	0545	0550	0555	0560	0565	0570	0575	0580	0585	0590	0595	05H0						
	128-152	5.0-6.0		0640	0645	0650	0655	0660	0665	0670	0675	0680	0685	0690	0695	06H0	06H1	06H2				
	153-178	6.0-7.0		0740	0745	0750	0755	0760	0765	0770	0775	0780	0785	0790	0795	07H0	07H1	07H2	07H3	07H4		
	179-203	7.0-8.0		0840	0845	0850	0855	0860	0865	0870	0875	0880	0885	0890	0895	08H0	08H1	08H2	08H3	08H4	08H5	
	204-229	8.0-9.0		0940	0945	0950	0955	0960	0965	0970	0975	0980	0985	0990	0995	09H0	09H1	09H2	09H3	09H4	09H5	09H6
	230-254	9.0-10.0		1040	1045	1050	1055	1060	1065	1070	1075	1080	1085	1090	1095	10H0	10H1	10H2	10H3	10H4	10H5	10H6
	255-279	10.0-11.0		1140	1145	1150	1155	1160	1165	1170	1175	1180	1185	1190	1195	11H0	11H1	11H2	11H3	11H4	11H5	11H6
	280-305	11.0-12.0		1240	1245	1250	1255	1260	1265	1270	1275	1280	1285	1290	1295	12H0	12H1	12H2	12H3	12H4	12H5	12H6
	306-330	12.0-13.0		1340	1345	1350	1355	1360	1365	1370	1375	1380	1385	1390	1395	13H0	13H1	13H2	13H3	13H4	13H5	13H6

Part Number Configuration

Example: C12BL-HL3M-UX0

This is the part number for a 12mil Thickness x 58.0mm OD with 50µm grit, special diamond concentration and bond hardness with customized option.



Grit size

Grit Size. K&S UniPlus blades for package singulation are available with diamond grit optimized for BGA/CSP,QFN or Ceramic package singulation. These are:

M 10µm
A 17 µm
P 20 µm
N 25 µm
B 30 µm
E 40 µm
C 50 µm
H 60 µm
D 70 µm

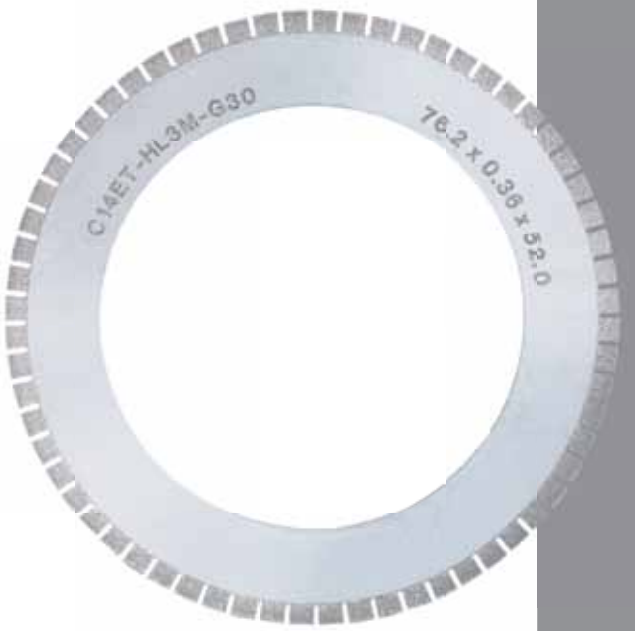
Bond Hardness & Grit Concentration

Note: UniPlus™ blades' bond hardness and grit concentration are Tailor made according to customer's application.

Outer Diameter (OD)

S 55.6 mm
L 58.0 mm
V 68.9 mm
T 76.2 mm

Slits Option & Customization



Blade Dimensions

UniPlus blades for package singulation are offered in a wide range of thicknesses and exposures (Hub type) to suit a variety of BGA/CSP,QFN or Ceramic application. The first two digits represent the maximum blade thickness in tenths of mils. The last two digits represent the minimum blade exposure (Hub type) in mils(refer to the table above). For Hubless configuration,L represents 58.0mm OD, S represents 55.6mm OD.

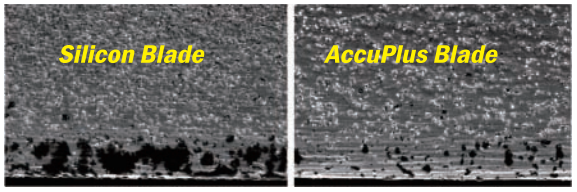
AccuPlus™ Hub Blade
A Customizable Solution for Discrete Wafer Dicing

AccuPlus™ – *New Hub Blades offer a customizable solution for discrete wafer dicing with improved efficiency and a lower cost of ownership.*

Highlighted Features:

- Customizable solution for thin, small die & backside coated discrete wafers
- Quality, precision and cost of ownership improvement
- Shortened pre-cut process for lower cost of ownership
- Two series of special nickel bond hardness
- Multi-levels of diamond concentration

Reduce Loading for Metallized Wafer



As a general trend in the discrete wafer market, wafers have continued to get thinner, while the overall die size remains small. Dicing technologies face the additional challenge of die movement and/or blade loading, which can eventually cause costly die chipping and cracks, impacting assembly and test site productivity when handling and processing wafers.

By optimizing key blade elements such as diamond grit size, diamond concentration, and nickel bond hardness, in conjunction with the newly introduced features, K&S **AccuPlus™** blades deliver superior cut quality, bond life and cost of ownership improvement to the discrete wafer dicing .

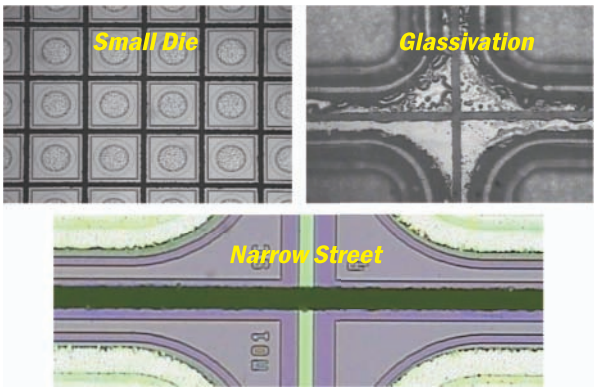
Special Nickel Bond Hardness

There are two series of special nickel bond hardness under the **AccuPlus™** Blades Line. The **Discrete** Series' bond hardness is designed for enabling high cutting power to increase production throughout and blade life, while the **Ultra** Series' bond hardness is optimized for high loading processes like metalized saw street and backside coated wafers.

Multi-Level of Diamond Concentration

Diamond concentration is a critical factor for blade cutting power. Lower concentrations provide greater resistance to blade loading, and higher concentrations enable higher feed rates and longer blade life. K&S **AccuPlus™** hub blades are available in different diamond concentrations to achieve the desired equilibrium among loading, blade life and throughput.

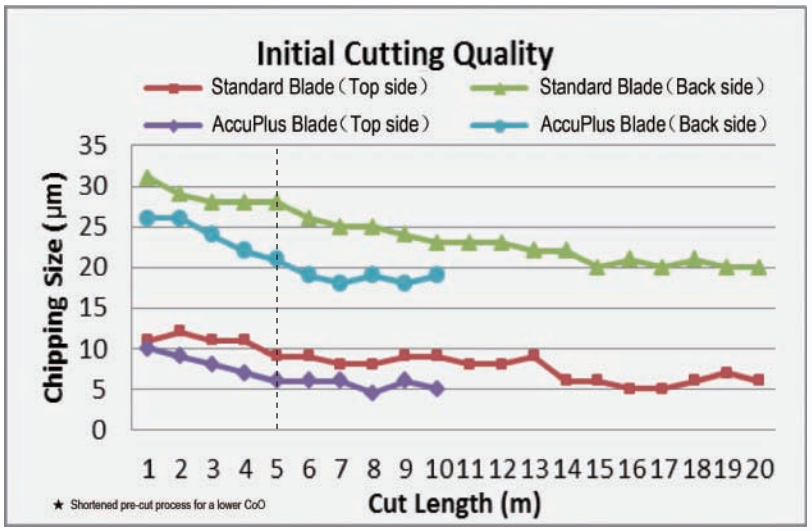
Discrete Device Type

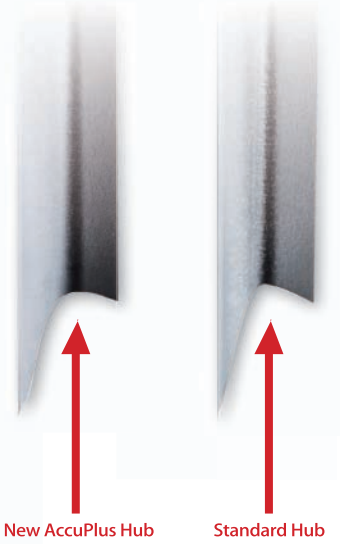


Special Hub Materials and Design for High / Low Spindle Frequency

Metalized saw street and thin wafer dicing requires higher spindle RPM to maintain blade cutting power and obtaining desired cutting quality. However, higher spindle RPM may induce unnecessary blade vibration and harmonic noise. K&S **AccuPlus™** hub blades are equipped with stronger materials and a special hub design to minimize blade vibration and noise caused by high spindle speed.

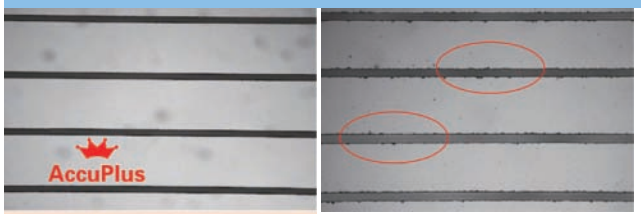
Improved efficiency and lower cost of ownership



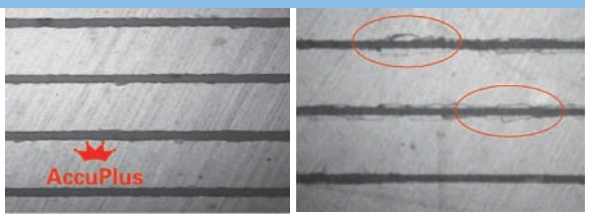


★ AccuPlus Vs.Standard blade cutting quality in 5m cutting length

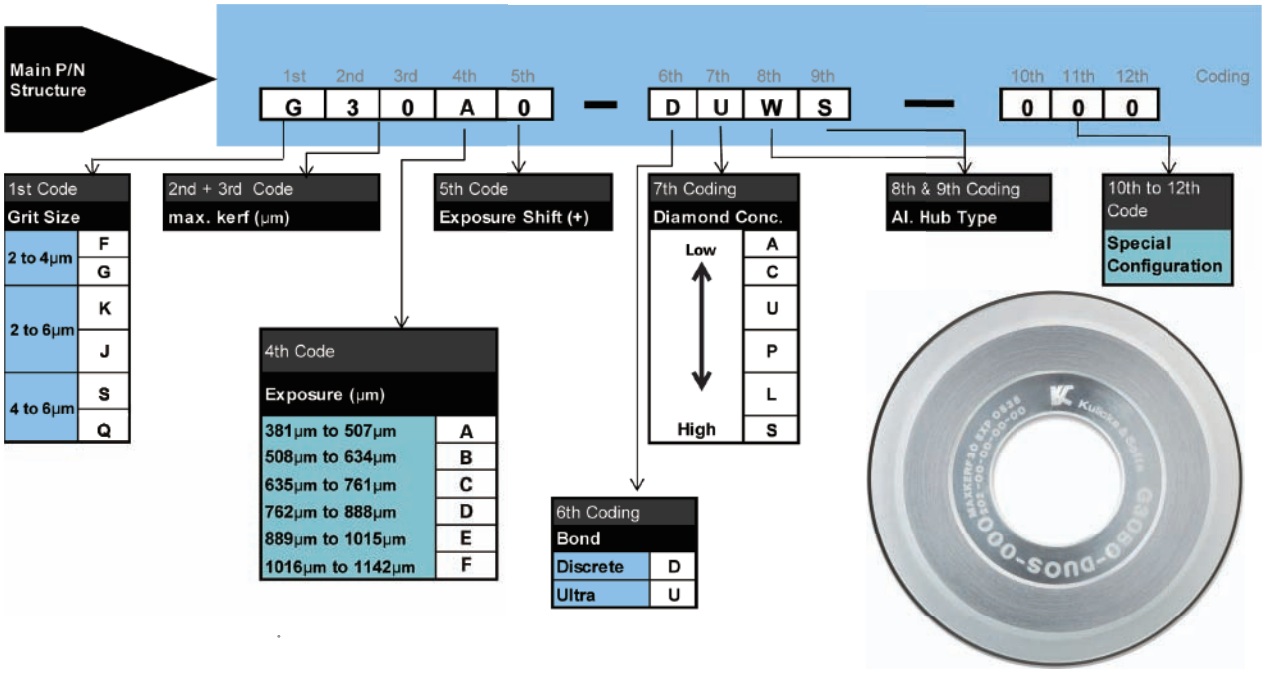
Top side



Back side



AccuPlus™ *Blade Part Number Configuration*



Handling Guidelines

IMPORTANT!

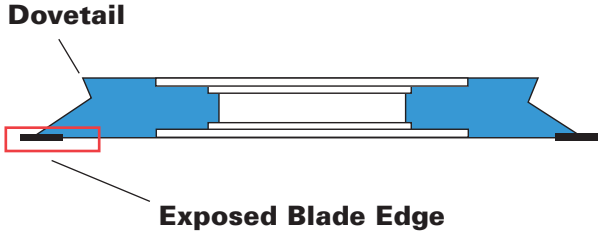
Proper blade handling is extremely critical through all phases of shipping, unpacking, and installation. Failure to follow the correct procedures can cause irreparable damage that, while invisible to the naked eye, may affect cut quality.

General Rules for Manual Handling

- We strongly recommend the use of the Blade Handling Tool to prevent damage during handling. If you do not have the tool, please follow the general guidelines below when handling the blades manually.
- When picking up or removing a blade from its clam shell, grasp the blade by the dovetail portion of the hub using the fingertips only. Never, in any case, touch the exposed portion (outlined in red) of the blade.

CORRECT

INCORRECT



- Keep fingernails short and wear latex finger covers when handling blades.
- Avoid accidental contact with any objects.
- Dropping the clam shell can damage the blade, even if the clam shell is closed. Do not use the blade if the clam shell has been dropped or subjected to any striking force.
- Please keep blades in their plastic cases or "clam shells" until ready to use. Also, when performing initial quality inspection, please keep the blade in the clam shell after the cover is opened.

Manual Blade Mounting

1. Carefully unwrap the box and remove a clam shell.

2. Hold the bottom of the clam shell horizontally in your palm, with the logo facing up, and open the clam shell lid.

Do not touch the exposed portion of the blade!

3. Keeping the clam shell horizontal, grasp the dovetail portion of the hub and carefully lift the blade vertically from the clam shell.

4. Holding the blade tightly, but with the wrist relaxed, carefully mount the blade on the spindle without contacting any portion of the dicing machine.

5. Lock the blade with the wheel nut and torque to proper settings provided by your dicer manufacturer.

Manual Blade Removal

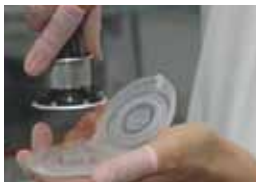
IMPORTANT! Proper removal of the blade is also very critical if the blade is intended to be reused. Please follow the instructions carefully. Do not force the blade when attempting removal.

- If necessary, use hot water to loosen the blade.
- If you intend to re-use the blade, follow the same general guidelines for handling the blade during mounting and carefully place the blade back into the clam shell with the face of the blade parallel to the bottom of the case. Do not allow the edge of the blade to contact the case at an angle.

Tool Mounting

1. Holding the open clamshell horizontally in your palm, pull back on the spring mounted sleeve to open the jaw grippers.

2. Insert the open grippers around the dovetail section of the blade and release the spring sleeve to firmly grab the blade.



3. Carefully mount the blade over the spindle wheel mount and check if blade is firmly seated against the wheel mount shoulder.

4. To release the blade from the mounting tool, pull the spring-loaded sleeve towards you to open the jaw grippers.

5. Check the blade again by pressing your fingers around the blade hub to make sure the blade is firmly seated against the back shoulder of the wheel mount.

6. Proceed to lock the blade with the wheel nut and torque to the proper settings provided by your dicer equipment manufacturer.

Hub Blade Handling Tool

Part Number: A11380-0000-000

Dressing Board

Part Number:

DRESSB-0000-001 – 180mesh, 125 x 125 x 1mm dimension

DRESSB-0000-002 – 2000mesh, 75 x 75 x 1mm dimension

K&S Blades Application Lab
State-of art Dicing Lab for Today's most Challenging Applications

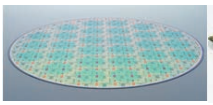
Advanced Dicing Equipments, Strong Technical Expertise, Over 30 Years of Dicing Experience...

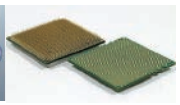
To maintain an emerging leadership position in the hub blades market segment, Kulicke & Soffa has made significant investments into major Research and Development engineering programs. Our state-of-the-art dicing lab in Suzhou and Kaohsiung is fully out fitted to perform thorough testing and to provide blade and process parameter recommendations for the most challenging applications.

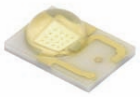
Experienced Applications

Wafer Dicing
- Discrete
- Logic & Analog IC
- Memory (DAF/Non DAF)
- LCD Driver IC
- Low-K Wafer

Package Dicing
- BGA
- QFN/DFN
- Ceramic
- LED


Silicon Wafer


BGA package


LED package


Leadless package


DFN package

QFN package

K&S Dicing Application Lab

- Suzhou, JiangSu, China
- Kaohsiung, Taiwan
- Singapore

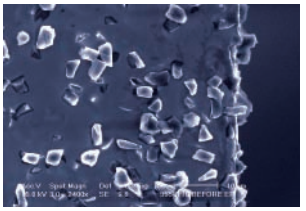
Lab Dicer:

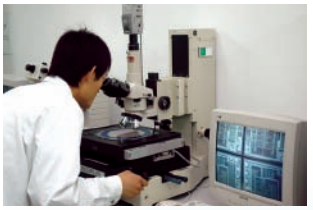
Accretech 300TX, K&S 7500
- Twin spindles
- 80K RPM
- Up to 12" wafer size
- UV cure

Advanced Analysis System

Hardware
- SEM
  Check blade loading
- EDX
  Check loading element
- High mag. Microscope
  Check dicing quality

Software
- JMP
- MINITAB
  For dicing data analysis, judgment





DOE Flow & Cycle time

Shortest report lead time: 2 weeks

Effective System
- DOE proposal review
- DOE replication
- Free sample blades
- On-site technical support

Worldwide Application Support Team

For sales, service and manufacturing locations, please visit www.kns.com

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08/2010


Kulicke & Soffa