How to compare present Diamond Dicing Blades for Performance

What your present blade supplier may not want you to know

Background
Most manufacturers will set up their production lines and collect data to establish performance history for their present diamond blade over time. Using their blade usage history and number of substrates cut they will establish present blade life. This data collected helps in determining their blade usage requirements for costing and purchase.

It is also from this data that they will establish performance requirements for any alternative blades to be measured against and compared. This is where the most serious mistakes are made. When evaluating alternative blades they tend to cut very little material and expect the same or better results that they show historically for their present blades in use. Many times these short tests will reject an alternative blade that may actually cut the manufacturers costs in half or in many cases by multiples of 5 to 10 times, if only the test was carried out further. There is a little more to testing than simply running the test longer, but it is this aspect of testing that is most commonly ignored.

The resin bonded diamond blade, to date, is the most commonly accepted tool for cutting QFN and similar metal/epoxy applications. Unlike the harder materials such as ceramics, sapphire, etc., QFN is relatively easy to cut and will be cut at much higher cutting feeds of 25mm/second or better. The resin blade’s expected life is also much higher in cutting these materials. What this means is, that it takes longer for the blade to acclimate to the QFN-like materials. The blade will take longer to “true” itself to the dicing saw’s spindle and to form its cutting edge for optimal dicing.

The Truing Process
Many dicing blades are ordered, “pre-trued”. This may help in speeding up the truing process on the dicing saw but it is not trued. This is like truing the tires for your car, off the car! Dicing blades must be “trued in” to the machine that is going to use them.

The harder the application, the faster the blade will true in. As mentioned above QFN-type applications are quite soft in relationship to other hard type materials and the “truing-in” process takes time. If life readings are taken before the blade can “true-in”, the true life of the blade had not yet been reached. The other issue is that most dicing saws will accumulate blade wear readings and it takes time for the earlier high blade wear readings to average out with the readings taken after the blade is trued in. One way around this is to throw out earlier readings taken during the “true-in” phase. One must remember, however, that when doing comparative testing, each blade should be tested and data collected exactly the same way. If you throw out early readings for one blade, the same should be done for the other blade it is being compared to.

The largest contributing factor that throws off testing is the “truing-in” process. The blade does not fit exactly on the metal blade adapter that holds it, and the metal adapter doesn’t have a perfect fit to the spindle nose. This error, in fit, creates an up and down action we call the “hammer effect”. At speeds of 30,000 RPM this action is detrimental to blade life, as well as quality, and if included in the test will give false results. In fact, if one were to remove the adapter with the blade installed from the spindle nose and immediately replace it to the spindle nose without removing the blade from the adapter, “hop” is reintroduced due to not being able to reinstall the adapter exactly as it came off. No fit is perfect.
How to compare present Diamond Dicing Blades for Performance (continued)

Returning to the opening statements the historical data collected over time already dilutes this “true-in” process and results are quite accurate. The problem lies in testing new blades that do not have such historical data and therefore testing must be done to eliminate the “true-in” process so accurate data can be collected.

Test Present Unused Production Blades
End users of these diamond blades should subject their own accepted production blades to the same exact test as the alternative blade to be certain the test is fair and accurate. Each time a test is run for an alternative, a production standard should also be run since dicing saw conditions such as blade cooling, blade adapter integrity, etc. change from day to day.

Comparative testing can be time consuming but the end result may pay off in a substantial savings to the end user and a true cost savings to their product lines to better compete in a highly competitive marketplace.

In-Production Testing
An alternative to the above testing procedure is to simply place the alternative blade on an existing dicing saw in production, monitor the quality of the cuts to ensure good parts are produced, and let it run until the blade is completely consumed. One must also take a new blade presently being used in production and monitor its results until consumed to make a fair comparative. This eliminates any conditions that are inherent in the dicing saw being used that may skew results in either direction.

This method reduces substantially any down time on the production line when dicing saws are simply not available to be pulled off-line. One should always take the time, however, when the end result can reduce production costs as substantially as the dicing blade. There exists extreme performance differences from blade manufacturer to blade manufacturer and the end users owe it to themselves to discover those differences to truly create an efficient production process a step ahead of their competition.