Diamond Dressing Tools: Bad, Good, Better, and the Best

Just because a diamond single point dressing tool has a real piece of natural diamond in it, it doesn't make it effective for dressing a precision abrasive grinding wheel. There are many diamond shapes, sizes, weights, and sources of mined natural diamond and synthetic man-made diamond.

Natural diamond single points for better results in dressing precision abrasive grinding wheels need to be grain-oriented. Natural diamond, such as bortz, cubes, slivers, irregulars, rounds, sharps, sawn tops, cracked, and pieces with a lot of mineral deposits are not as cost-effective. There are other uses for this natural diamond material. This material can be recrushed and processed into mesh to be used in grit tools, plated tools, and powders.

One of the best natural diamond shapes is the octahedron. This shape is a back-to-back-shaped pyramid. All the grains run to the six corners which resist the abrasion of the precision abrasive grinding wheel.

The top 25% of the octahedron is the cost-effective section. Once past the hard grain direction, the single point wears quicker. That's the time to reset the single point diamond tool. Never grind into the steel shank, as it seldom has a benefit and will lead to less usefulness. Grinding into the steel shank may damage one of the other pyramid corners.

Dressing infeeds over .001 generates excessive friction and heat, and increases wear on the natural diamond single points. Dressing infeeds over .001 also crushes the vitrified bonds immediately. Crushed bonds quickly come apart leaving voids or gullets on the surface. These voids quickly fill up with swarf. This is called loading. Loaded wheel

causes prematurely redressing, which increases diamond and wheel wear plus the loss of production time. Dressing fine grit precision grinding wheels requires less than .0005 infeed per pass.

There are also engineered diamond dressing tools that use maccles, ovals, castings, and other octahedrons such as sharp crystals. In addition, there are ballas, carbonados, and a variety of special natural diamonds used for diamond rolls, blocks, and other special tools. These natural diamond types are cost-effective.

The cost of natural diamond single points varies greatly. This can confuse the buyer, but it should also make the buyer cautious and smarter. There is no "free ride" in buying natural diamond dressing tools. You will get what you pay for. For example, natural diamond Congo material which is greenish yellow in color. This material is not as effective as West African natural diamond for single point dressing. There is a difference in diamond mined from different parts of the world.

There are consumable applications, where resetting isn't practical. For example, the natural diamond single points used on forming the regulating wheels on centerless grinding machines use first quality, 1/4 carat diamonds, octahedron shaped that are to be totally consumed. They are not indexed. Another example is a class of natural diamond single point dressing tools referred to as economy grade. These octahedron-shaped diamonds have one decent primary point. They are usually not reset and are consumed as is. They cost less and do less.

For tight tolerance dressing applications and low RMS finish applications, expensive diamonds are cost-effective. These natural diamond tools are indexed at least twenty times per one revolution of the diamond tool. They are usually used on cylindrical grinding applications, which use

large diameter wheels and weigh 3-4 carats. They are reset four to five times over several years. This is the opposite of typical dressing applications.

What this begins to tell you is that the "Application Is Everything."

Single point diamond dressing tools are what I refer to as "trick tools." They can rough dress a grinding wheel and make it act aggressively, and can also close the surface of a grinding wheel and get it to grind low RMS finishes. They have limits as well: Taper is one and roundness is another. Too large and wide wheels require mesh (grit) or multipoints. On large diameter and wide wheels it takes a handset diamond cluster to carry the wheel. There are also other engineered dressing tools such as particle (grit/mesh) tools, fliesing tools, inline tools, random set tools, and dressing tools made for specific grinding machine tools and fixtures.

I've got a book from the IDA (Industrial Diamond Association) on diamond dressing tool shanks, which lists hundreds of sizes and shapes. It seems that every grinding machine tool builder had an engineer, which designed his own tool shank as a memorial to himself. Then there are different tapered shanks, threaded shanks, turnable head shanks, and metric shanks. All this adds to the difficulty in delivery, standardization, and cost.

What is the best? The best is what produces the most at a reasonable cost. For additional technical briefs, log on to *www.todit.com*, and or phone 800-227-5905 and ask for the "Tech Services" Department.

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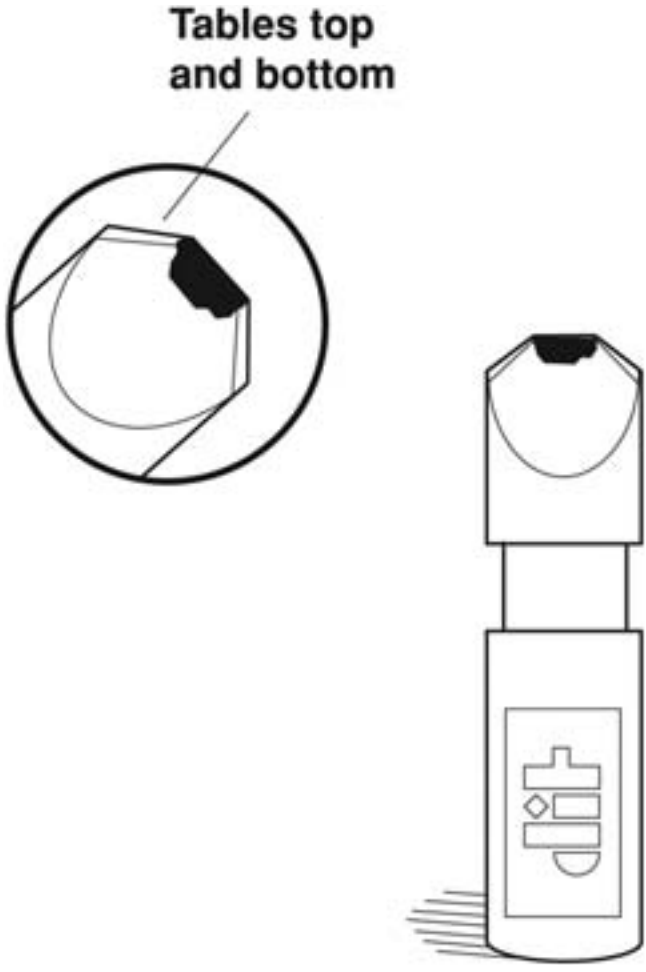
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