

Morphology of Mixed-size Agglomerated diamond Abrasives and Its Polishing Performance

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Micro-fracture of agglomerated diamond abrasives is helpful to self-conditioning of fixed abrasive pad and its machining performance in stability. The effect of bond concentration and primary diamond particle size on the morphology of agglomerated diamond abrasives (ADA) and the polishing performance of fixed ADA pad was explored. Results show that if the primary diamond particles with a size of 2~4 microns adopted, the morphology of ADA varies with the bond concentration. The bond bridge of ADA is difficult to be seen when the bond concentration is 10% in mass. It appears when the bond concentration is 13%, and it is easy to be seen when the bond concentration reaches 18%. When the bond concentration exceeds 20%, the primary diamond particles is fully covered with bond. Results also that if the primary diamond particles with a size of 2~4 microns and those with a size of 0.5~1 micron adopted simultaneously, the coarser primary diamond particles are covered with those finer particles, and the porosity in the ADA drops. The fixed abrasive pad with mixed-size agglomerated diamond abrasives has a high material removal rate, 15 times higher than that with ADA with finer primary particles, while the average surface roughness of polished quartz glass is in the range of 60-100nm, smoother than that with ADA with coarser primary particles,
