

MICRO X-RAY DIFFRACTION ORIENTATION ANALYSIS OF DIAMONDS USED FOR METAL ROLLER PATTERNING

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To enhance the quality of an image displayed on a flat panel device, patterned polymer films can be used to direct available light towards the person viewing the display. To generate this film, a pattern is embossed on the polymer during melt extrusion. The embossing process can be accomplished using a metal roller with a pattern scribed on the roller surface. The pattern is produced using a tool comprised of a diamond tip and it is important that the diamond be correctly aligned crystallographically. Proper alignment insures the diamond will not chip or wear prematurely resulting in irreparable damage to the roller.

A micro XRD technique using a two-dimensional detector has been developed allowing for inspection of diamond tools before use in the roller manufacturing process. A single wavelength Laue pattern can be generated in less than one minute, the resulting data analyzed, and the diamond characterized as acceptable or unacceptable. The characterization is accomplished by using azimuthal angle spacings between Laue spots correlated to a test group of diamond scribes that were evaluated for hours of use before failure. A discussion of diamond orientation used in scribe tools and the method developed for this study will be presented.

