

Use of the Crossed-cylinder Wear Test to Evaluate the Compatibility on Mating Couples

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Many tools in industry rely on point and line-contact tribosystems to work. Scissors and similar cutting devices have a point of contact that moves along a shear angle. Rotating slitter knives that contact each other do so at tiny spots. Punches and dies similarly rely on relative contact in very small areas. What materials are suitable for these kinds of applications?

The crossed-cylinder wear test was developed to simulate these kinds of cutting tool tribosystems. The contact starts out as a point between cylinders oriented 90° to each other; one cylinder rotates, one is fixed. This paper describes the use of the ASTM G 83 crossed-cylinder test to assess the self-mating and cross-mated characteristics of more than forty tool material couples. The test clearly demonstrated favorable couples. The winning couples from the test program proved to be successful in a variety of applications, but the ASTM test may be too severe since many couples made loud noises during the test; most real-life tribosystems are not allowed to run under such conditions.

It is proposed that less aggressive test methods be developed to be used after rough screening tests. There may be pressure/velocity thresholds that are being exceeded. Reliability of these kinds of tests may be enhanced by closer simulation of real operating conditions.