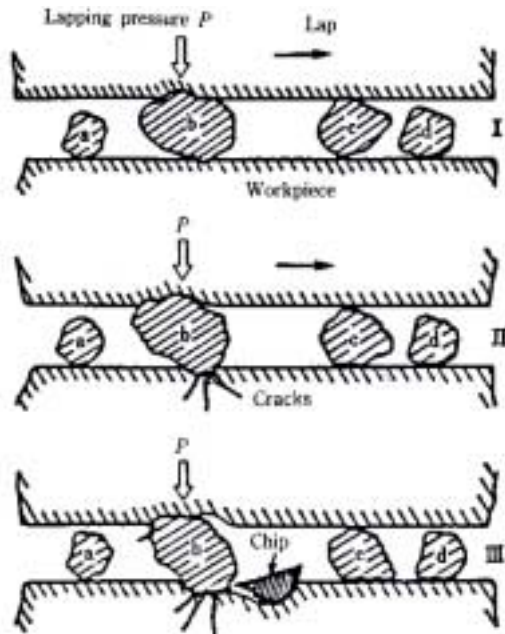


LAPPING OF CERAMIC MATERIALS

By Mariana Pruteanu

As a finishing process, lapping plays a major role in establishing the final dimensional and surface characteristics for many industrial parts. Lapping operation is used for many workmaterials including glass, ceramic, plastic, metals and their alloys, sintered materials, stellite, ferrite, copper, cast iron, steel etc.



Lapping is primarily considered to be a three-body abrasive mechanism due to the fact that it uses free abrasive grains that can roll or slide between the workpiece surface and the lapping plate, although some grains become embedded in the lap leading to two-body abrasion. Lapping is a loose abrasive machining process that combines abrasive particles within an oil or aqueous medium depending on the material being finished. Fine abrasive is applied, continuously or at specific intervals, to a work surface to form an abrasive film between the lapping plate and the parts to be lapped. Each abrasive grain used for lapping has sharp irregular shapes and when a relative motion is induced and pressure applied, the sharp edges of the grains are forced into the workpiece material. Each loose abrasive particle acts as a microscopic cutting tool that either makes an indentation or causes the material to cut away very small particles. Even though the abrasive grains are irregular in size and

shape, they are used in large quantities and thus a cutting action takes place continuously over the entire surface in contact

The experiments done in lapping are focused on workpieces made by aluminum oxide, Al_2O_3 . Ceramic workpieces (rings with 0.5" ID, 0.8" OD and 0.2" thickness) were lapped with diamond slurry on the single-side lapping machine using a twelve-inch, radially-grooved cast iron plate and conditioning rings. The slurry was based on either mono-crystalline or polycrystalline diamond grains with identical particle size distribution. Diamond abrasive was suspended in a water-based carrier and supplied in the work area by a peristaltic pump.

A significant component of these lapping experiments is the evaluation of the performance of mono-crystalline and polycrystalline diamond slurry. Also, the tests intend to determine the effect of the machining time on the surface roughness and material removal rate.

