

Mechanical and microstructural characterization of polyurethane foams

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Abstract. For the manufacture of polyurethane foam having a certain density, we seek to control as much as possible the development of the microstructure. Therefore, the final product could exhibit the desired properties for a notable application in non-lethal projectiles. These last warheads based on these alveolar materials must be able to put out of harm's way a target without causing a permanent injury or a fatal outcome. The mechanical characterization was carried out by dynamic drop weight test, on a machine designed and carried out locally; the mechanical properties of polyurethane foams are highly dependent on density, cell structure (size and shape) and percentage of open and closed cells. It may occur that the foam has a preferential orientation in the cell structure. In order to visualize of the semi-opened cells of the alveolar polymer, this later is described by Raman spectroscopy analysis. It appears that the cellular polymer has stubborn regular cellular structures with noticeable overlap reversibility.

Keywords: Polyurethane Foam, Drop weight tests, Non-lethal Projectiles, Raman spectroscopy analysis.